



*Buildings and Infrastructure Protection Series*

# Integrated Rapid Visual Screening of Mass Transit Stations

BIPS 02/March 2011



**Homeland  
Security**

Science and Technology



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# Foreword and Acknowledgments

Since the events of September 11, 2001, government officials, law enforcement, the design community, transportation specialists, and first responders have understood that the risk environment has changed and that the Nation's critical assets must be protected. The Department of Homeland Security (DHS) has identified transportation infrastructure as a Critical Infrastructure and Key Resource (CIKR) Sector. Mass transit, which includes heavy rail, light rail, commuter rail, trolleys, and buses, is part of the transportation infrastructure. Mass transit stations function as hubs to allow passengers to board and disembark from mass transit vehicles and to transfer between modes of transport.

DHS has sponsored the development of a methodology for assessing the risk and resilience of mass transit stations to terrorist attacks and selected natural hazards. The methodology, referred to as the integrated rapid visual screening (IRVS) of mass transit stations, was developed by the DHS Science and Technology Directorate (DHS S&T), Infrastructure Protection and Disaster Management Division, in partnership with the Risk Assessment Division of the Transportation Security Administration (TSA). TSA is currently adopting the IRVS of mass transit stations to enhance its risk assessment of transportation systems throughout the country. The following were also involved in the development and testing of the methodology for the IRVS of mass transit stations:



"Integrated" in IRVS indicates that the methodology includes the risk of both terrorist

acts and natural hazards and an assessment of both risk and resiliency.

Massachusetts Bay Transportation Authority; Port Authority of New York and New Jersey; and private-sector stakeholders involved in the design, operation, and management of critical infrastructure.

The result of an IRVS of mass transit stations is a quantifiable assessment of the risk of a given mass transit station to a terrorist attack or natural disaster that leads to catastrophic losses (fatalities, injuries, damage, or business interruption) and a quantifiable assessment of the resiliency of the station (ability to recovery from such an event).

## Need and Purpose

**T**he number of mass transit stations and number of people who use mass transit make mass transit a target for terrorists. In the United States, there are more than 1,025 mass transit stations, and in 2008, passengers took 10.5 billion trips on mass transit and rode transit vehicles for 55.1 billion miles. The largest transit agency, the Metropolitan Transit Authority New York City Transit, carried passengers on 3.3 billion trips for 11.9 billion miles (American Public Transit Association, 2010).

Terrorist attacks on subway stations and in tunnels have wreaked significant damage and caused societal disruption. Aggressors have successfully orchestrated mass transit attacks in well-guarded major cities. For example, in 2004, train bombs in Madrid killed 191; in 2005, suicide bombers in London's subway killed 52; in 2006, train bombs in Mumbai killed 209; and, in 2010, a terrorist attack in Moscow's subway killed at least 40.

Furthermore, mass transit can often be subjected to the collateral damage of attacks on other targets because of its location. For example, collateral damage from the attacks of September 11, 2001, rendered the Port Authority Trans-Hudson (PATH) commuter rail line and station unusable for 2 years. The PATH station and tunnel were connected to

the World Trade Center towers via an underground concourse and shopping center. The collapse of the towers destroyed the station and led to flooding in the tunnels. The rail line carried 67,000 passengers to Lower Manhattan every weekday (FHWA, 2003).

In the United States, there are more than 1,025 mass transit stations.

In 2008, passengers took 10.5 billion trips on mass transit and rode transit vehicles for 55.1 billion miles.

The goals of terrorists are to attract attention, disrupt the economy, create fear, and disrupt the social fabric. Selected targets may not have a pattern. Terrorists may use methods that have been used before or they may use new methods. The possibility that new methods may be used complicates mitigation.

To better quantify, qualify, and mitigate the risks to mass transit systems, DHS S&T has dedicated resources to developing risk assessment and mitigation tools to protect mass transit stations and tunnels. The assessment of mass transit stations is described in this document, and the assessment of tunnels is described in the *Integrated Rapid Visual Screening of Tunnels* (DHS, 2011b).



The primary purpose of the IRVS of mass transit stations is to rank the risk in a group of mass transit stations in a community.

The primary purpose of the IRVS of mass transit stations is to rank the risk in a group of mass transit stations in a community. The results of an IRVS can also be used in infrastructure-specific risk assessments and higher level assessments of threats, consequences, and vulnerabilities.

This document is the manual for conducting an IRVS of mass transit stations, including subway stations, and as such, provides guidance in rating a mass transit station's potential risk of and resiliency to terrorist attacks and selected natural disasters (fire and flooding).

## Relationship of the IRVS of Mass Transit Stations to the Risk Management Series

The technical concepts and field application of the methodology are based on the Risk Management Series (RMS), a widely accepted series of publications that provide risk evaluation methods and design guidance for mitigating multihazard events. The design concepts from the RMS are represented in the IRVS methodology in the evaluation of favorable and unfavorable characteristics of a mass transit station that influence the risk of the structure to specific threats.

Furthermore, the field application of the IRVS reflects the procedures for risk assessment outlined in several RMS publications. The series was developed by DHS's Federal Emergency Management Agency (FEMA) after the events of September 11, 2001. The IRVS methodology is drawn largely from the following three RMS publications:

- FEMA 426, *Reference Manual for the Protection of Buildings Against a Terrorist Attack* (DHS, 2011c)
- FEMA 452, *Risk Assessment, A How-To Guide to Mitigate Potential Terrorist Attacks Against Buildings* (FEMA, 2005)
- FEMA 455, *Handbook for Rapid Visual Screening of Buildings to Evaluate Terrorism Risk* (FEMA, 2009)

The differences between the rapid visual screening (RVS) described in FEMA 455 and the IRVS of mass transit stations described in this manual are:

- RVS is used to screen buildings, and IRVS is used to screen mass transit stations
- RVS focuses on the risk of terrorist acts, and IRVS focuses on both terrorist acts and selected natural hazards (fire and flooding)
- RVS focuses on risk, and IRVS focuses on both risk and resiliency

“Integrated” in IRVS indicates that the methodology includes the risk of both terrorist acts and natural hazards and an assessment of both risk and resiliency.

## Relationship of the IRVS of Mass Transit Stations to the National Infrastructure Protection Plan

The IRVS methodology closely follows the general risk management framework and definitions identified in DHS’s National Infrastructure Protection Plan (NIPP) (DHS, 2009b), including the Critical Infrastructure and Key Resources (CIKR) Sectors. The risk management framework in the NIPP involves scenario-based consequence and vulnerability estimates and an assessment of the likelihood that a postulated threat will occur. The IRVS is based in part on the NIPP’s core criteria for risk assessments, as follows:

- **Documented** – This manual includes the types of information that are collected during the IRVS and how the information is synthesized to generate a risk and resiliency assessment. All assumptions, weighting factors, and subjective judgments are explained.
- **Reproducible** – The methodology has been tested to ensure that the results are reproducible.
- **Defensible** – The components of the methodology are integrated logically, and disciplines that are relevant to the methodology are incorporated appropriately (e.g., engineering, architecture, construction, emergency management, security). The methodology has been tested to ensure that the results are reproducible, and the results produced by the methodology have been validated.
- **Complete** – The methodology includes an assessment of consequences, threats, and vulnerabilities for every defined scenario and an assessment of the resiliency to postulated threats.

The NIPP includes the 18 CIKR Sectors that are identified in Homeland Security Presidential Directive 7. CIKR Sectors are the assets, systems, and networks that provide similar functions to the economy, government, or society. The IRVS incorporates the 18 CIKR Sectors in the target density evaluation and includes all sectors in determining the threat of collateral damage from attacks on other targets.

## Partnership

**D**HS S&T and the Risk Assessment Division of the Transportation Security Administration worked in partnership to develop the IRVS methodology. The partners reviewed the factors involved in risk and resiliency scoring and conducted pilot and field studies of a variety of mass transit stations throughout the Nation. TSA plans to use the tool to enhance its risk assessment of transportation systems throughout the country. Equally important was the cooperation provided by the Massachusetts Bay Transportation Authority and the Port Authority of New York and New Jersey. Both agencies provided DHS with invaluable information, including how the methodology could realistically be expected to be used, which helped determine the scope of the methodology.

## Intended Audience

**T**his manual is intended for both technical and stakeholder audiences. Technical audiences include potential screeners and personnel who are knowledgeable about mass transit stations but who may not have a high level of expertise. Stakeholders include owners, operators, and decision-makers involved in the planning and maintenance of transit stations.

The intended audience includes:

- Transportation authorities
- City, county, and State officials
- Emergency managers
- Law enforcement personnel
- Facility managers
- Security consultants
- Engineers, architects, and other design professionals

This publication has been produced by the Department of Homeland Security (DHS) Science and Technology (S&T), Infrastructure Protection and Disaster Management Division (IDD).

## Acknowledgments

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This publication was prepared under contract to DHS. It will be revised periodically, and comments and feedback to improve future editions are welcome. Please send comments and feedback to [bips@dhs.gov](mailto:bips@dhs.gov).





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# Overview



## In this chapter:

The methodology, referred to as integrated rapid visual screening (IRVS), can be used by transit agencies to assess a transit system that includes buildings, tunnels, and mass transit stations.



In response to the need to improve the protection of the Nation's critical assets, the Department of Homeland Security's Science and Technology Directorate (DHS S&T) has initiated the development of a methodology for assessing the risk and resilience of buildings, tunnels, and mass transit stations to terrorist attacks and natural disasters that result in catastrophic losses (fatalities, injuries, damage, or business interruption). Resilience is the ability of a facility to recover from a terrorist attack or natural hazard (see Section 1.3.2 for more information on resilience).

The methodology, referred to as integrated rapid visual screening (IRVS), can be used by transit agencies to assess a transit system that includes buildings, tunnels, and mass transit stations.

## 1.1 IRVS Family

The IRVS of MTS (described in this Manual) is just one type of infrastructure in the IRVS family developed by DHS S&T. Infrastructure-specific IRVS assessments have also been developed for buildings and tunnels. The IRVS family is described in the following documents published by DHS S&T:

- BIPS 02, *Integrated Rapid Visual Screening of Mass Transit Stations* (DHS, 2011)
- BIPS 03, *Integrated Rapid Visual Screening of Tunnels* (DHS, 2011b)
- BIPS 04, *Integrated Rapid Visual Screening of Buildings* (DHS, 2011a)

Each IRVS assessment is tailored to evaluate the unique characteristics of the infrastructure type that influence the risk and resiliency. The IRVS family can be used in conjunction to evaluate a system that may include mass transit stations, tunnels, and buildings.

## 1.2 Validation

DHS S&T validated the IRVS through alpha and beta testing in partnership with the Transportation Security Administration (TSA) and in cooperation with Massachusetts Bay Transportation Authority (MBTA) and Port Authority of New York and New Jersey (PANYNJ). One objective of the alpha and beta testing was to evaluate or determine the following:

- User-friendliness of the documentation and software
- Clarity of the description of the methodology
- Duration of a typical evaluation by newly trained assessors
- Sensitivity of the scoring system (attribute weights) to various station attributes
- Variation among scores for different station types
- Consistency of results

A second objective of the testing was to collect data on a wide array of mass transit stations with unique characteristics throughout the Nation.

The results of the alpha and beta testing were used as a basis for:

- Adding, deleting, and modifying characteristics
- Modifying the weighting factors for attribute options

- Calibrating the tool to obtain accurate, consistent, and reasonable risk scores for each IRVS for different types of stations. Calibration of scoring includes the overall risk score and the scores for each threat scenario and the consequences rating, threat rating, and vulnerability rating.

The IRVS of MTS was validated in four of the largest mass transit systems in the United States: New York City, Washington D.C., Boston, Cleveland, and St. Louis. In addition, this manual was reviewed by TSA, MBTA, and PANYNJ.

DHS S&T is developing a design program that promotes high performance in resistance to hazard events, resilience, security, sustainability, and energy efficiency.

## 1.3 Risk and Resilience

**T**he two objectives of the IRVS of MTS are to assess a mass transit station's risk of a terrorist attack or selected natural hazards (fire and flooding) and resilience to such an event.

### 1.3.1 Risk

Risk is the likelihood of the occurrence of an unfavorable event that leads to catastrophic losses (fatalities, injuries, damage, or business interruption). The three components of risk are consequences, threat, and vulnerability. Consequence is the level, duration, and nature of loss from an unfavorable event; threat is the likelihood of a manmade or natural unfavorable event with the potential to harm life, information, operations, the environment, and/or property; and vulnerability is defined as a physical feature or operational attribute that renders an entity open to exploitation or susceptible to a given hazard. See Section 2.5.2 for more information on consequences, threat, and vulnerability.

Risk is the likelihood of the occurrence of an unfavorable event that leads to catastrophic losses (fatalities, injuries, damage, or business interruption).

The three components of risk are consequences, threat, and vulnerability.

### 1.3.2 Resilience

Resilience is defined as “the ability to resist, absorb, recover from, or successfully adapt to adversity or a change in conditions” (DHS, 2009b). Figure 1-1 shows an example of an asset’s resilience after an event.



**Resilience** is defined as the effectiveness of protective measures to reduce the impact of a catastrophic event and the capacity to absorb, adapt, and rapidly recover from the event.

Resilience depends on robustness, resourcefulness, and recovery.

- Robustness is defined as “the ability to maintain critical operations and functions in the face of crisis” (DHS, 2009a). Robustness measures include barriers, cameras, alarms, access control, redundancy of critical infrastructure systems and components. Robustness measures also include mitigating construction techniques that are designed to prevent a structure from collapsing after an explosion; structural retrofits; and debris mitigation techniques such as window films.
- Resourcefulness is defined as “the ability to skillfully prepare for, respond to and manage a crisis or disruption as it unfolds” (DHS, 2009a). Resourcefulness factors include training and preparedness, exercises, information sharing, security awareness programs, and ongoing assessment of risk.
- Recovery is defined as “the ability to return to and/or reconstitute normal operations as quickly and efficiently as possible after a disruption” (DHS, 2009a).

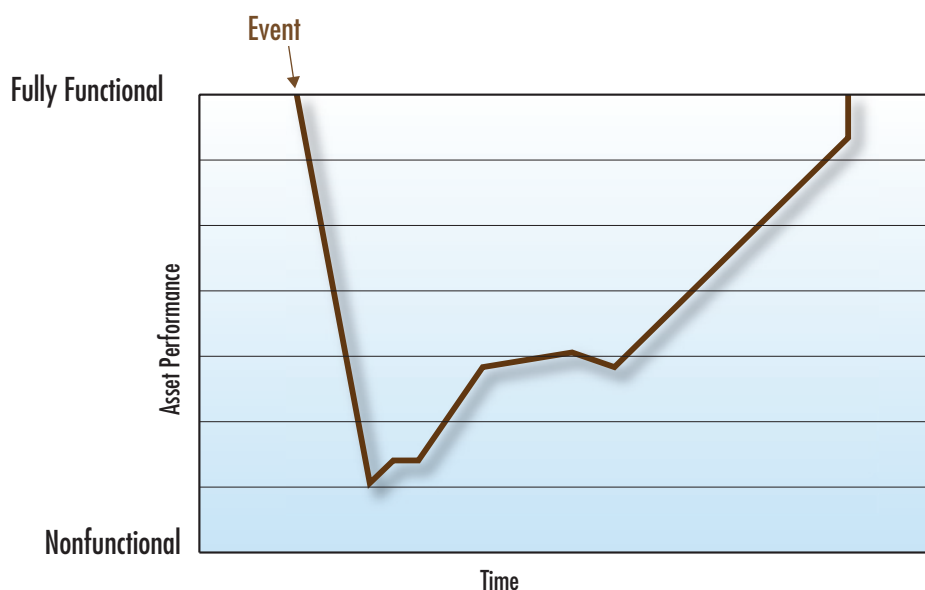


Figure 1-1:  
Example of resilience

## 1.4 Organization of the Manual

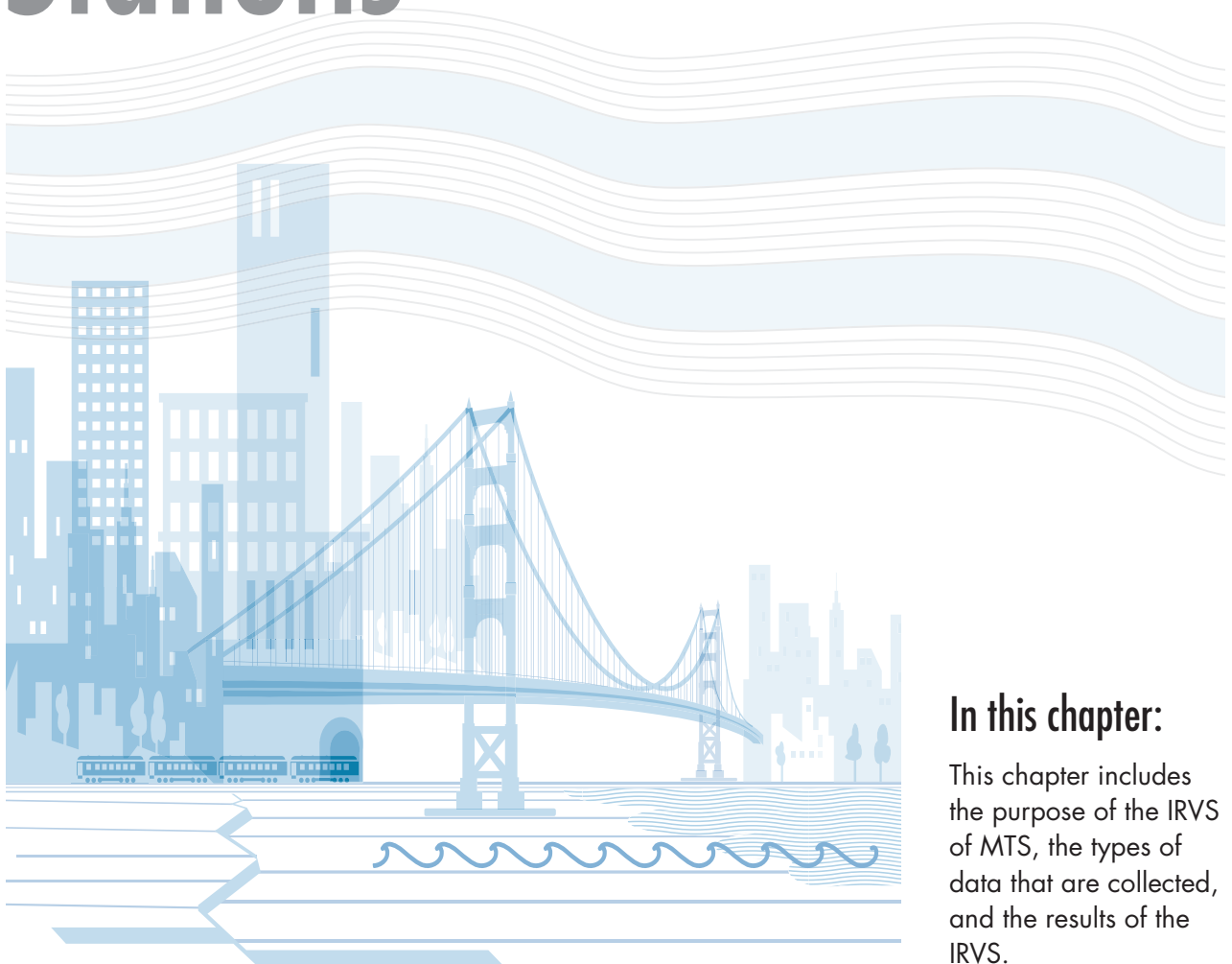
The information in this manual is organized as follows:

- Introduction to the IRVS of Mass Transit Stations (Chapter 2)
- Conducting an IRVS of Mass Transit Stations (Chapter 3)
- Completing the Data Collection Form (Chapter 4)
- References (Chapter 5)

Supplemental information is provided in the following appendices:

- Appendix A: Acronyms and Abbreviations
- Appendix B: Glossary
- Appendix C: IRVS Database User Guide
- Appendix D: Data Collection Form: Paper Version
- Appendix E: DHS Infrastructure Taxonomy

# Introduction to IRVS of Mass Transit Stations



## In this chapter:

This chapter includes the purpose of the IRVS of MTS, the types of data that are collected, and the results of the IRVS.



This chapter includes the purpose of the IRVS of MTS, the types of data that are collected, and the results of the IRVS. Chapters 3 and 4 explain how to conduct the IRVS and input data into the IRVS Database, respectively.

## 2.1 Purpose of the IRVS of Mass Transit Stations

**M**ass transit refers to public transportation or transportation systems, usually publicly owned and operated, that are designed to move large numbers of people in various types of vehicles. Mass transit includes heavy rail, light rail, commuter rail, trolleys, and buses (Figures 2-1 and 2-2). A mass transit station is a structure that serves as a terminal for a mass transit system. Stations function as hubs to allow passengers to board and disembark from mass transit vehicles and to transfer between modes of transport (e.g., from a train to a bus). Stations also serve as payment checkpoints. Stations that are underground and serve railways are typically referred to as subways or metro stations (Encyclopædia Britannica, 2011).

The purpose of the IRVS of MTS is to assess a station's risk of a terrorist attack or selected natural disaster (fire or flooding) and the resiliency of the station (the ability to recover from such an event). The results of the assessment can be used to avoid or minimize catastrophic losses—fatalities, injuries, station destruction or damage, and business interruption—from a terrorist attack or natural disaster.

Figure 2-1:  
Interior of a subway car







Figure 2-2:  
Platform area of a mass transit  
station

The IRVS provides an assessment of the risk of a station by evaluating the consequences of, threat of, and vulnerability to a terrorist attack or natural disaster. The IRVS also provides an assessment of the resilience of a station by evaluating a station's robustness, resourcefulness, and potential for recovery.

The IRVS generates separate scores for risk and resilience. The information that is collected and the scores can be used to help:

- Identify, collect, and store vulnerability data that allow re-examination of risks during consideration of protective measures or after protective measures have been implemented
- Collect and store reported assessment information for mass transit station management
- Rank vulnerabilities and consequences in a mass transit station system indicating which stations may be more at risk and require higher protection
- Determine and rank risks within a particular transit station in order to allocate potential resources to reduce major vulnerabilities cost effectively



The **risk score** is a numeric value that describes the risk of catastrophic loss from a terrorist attack or natural disaster at a mass transit station.

The **resilience score** is a numeric value that describes the ability of a mass transit station to resist, absorb, and recover from a potentially disruptive event at a mass transit station.

- Understand potential cascading effects to the transit system by assessing a group of mass transit stations
- Understand resilience, potential down time, and economic and social implications if a mass transit station is affected by a catastrophic event



Anticipate the increased risks during special events that affect the peak flows of the station in order to plan properly and implement protective measure

- Identify which security measures should be implemented immediately during high alerts
- Anticipate the increased risks during special events that affect the peak flows of the station in order to plan properly and implement protective measures; special events (e.g., sporting events, concerts, festivals) cause an abnormally high volume of ridership.

## 2.2 Stakeholders

**T**he stakeholder is the group or entity that decides to conduct an IRVS, owns the results of the IRVS, and makes many of the decisions regarding the IRVS. In most cases, the stakeholder is the owner or operating authority of the mass transit station or group of stations but can also be a law enforcement agency or a Federal, State, or local government agency.

The stakeholder or stakeholder's personnel may conduct the IRVS. For example, a transit authority may create a task group consisting of its security personnel and engineers to conduct an IRVS of the transit system. The transit system may opt to hire a consulting group to conduct the IRVS.

## 2.3 Screeners

**T**he IRVS was developed so that screeners can be local operators, law enforcement officers, or others outside the design community without a high level of expertise. Screeners can conduct an IRVS with a reasonable level of certainty after brief training, thus reserving technical experts such as engineers and architects for more in-depth assessments. See Section 3.1.2 for more information about screeners and the IRVS Team.

## 2.4 Time Required for the IRVS

One of the strengths of the IRVS of MTS is how quickly it can be completed. An assessment can typically be conducted in approximately 2 days by one or two screeners, facility management, and key staff. The field assessment is designed to be completed by two screeners in a few hours, depending on the complexity of the station and the availability of information prior to the assessment.

## 2.5 Characteristics, Attributes, and Data

This section describes the types of data that are collected during the IRVS and how the data are recorded and stored.

The various characteristics of mass transit stations are evaluated in the IRVS. A characteristic is a physical component, function, or operation that relates to consequences, threat, and vulnerability. Examples of characteristics are number of tracks, number of entrances, natural protective barriers, the presence of hazardous materials, construction material, and station elevation.

An attribute is a subcategory of a characteristic. For example, for station elevation (characteristic), the attribute may be at grade, at street level, above grade, below grade (above water table), below street level, above water, or below grade (below water table). Screeners select one attribute from a set of attribute options for each characteristic. Some characteristics have multiple sets of attributes, which reflect the need to normalize regional and other types of disparities.



An attribute is a subcategory of a characteristic. Attributes are weighted depending on their degree of risk.

Attributes are weighted depending on their degree of risk. For example, a below-grade elevation has the most risk compared to other elevations and is therefore given the heaviest weight of the attribute options for station elevation.

Characteristics are grouped into the risk components of consequences, threat, and vulnerability, depending on which component the characteristic would affect. See Section 2.5.2 for information on the components of risk. Some characteristics affect more than one component.

The attributes of characteristics that are more important than others are weighted more heavily than the attributes of less important

**“Characteristic”** refers to the physical components, function, and operation of a mass transit station. **“Attribute”** is a subcategory of a characteristic.

characteristics. Characteristics with heavily weighted attributes require careful evaluation because of their influence on the risk score. A small difference in the assessment of these characteristics can change the risk and resilience scores significantly.

The following list contains the characteristics that are weighted more heavily than other characteristics. The numbers in parentheses refer to the

section of the IRVS catalog that the characteristics appear in. The IRVS catalog is provided in Chapter 4.

- Peak number of riders/transfers per day (1.4)
- Station locality (1.5)
- High-value/CIKR targets (1.7 and 2.4)
  - Zone 1 (within 300 feet of the station)
  - Zone 2 (between 300 and 1,000 feet of the station)
- Impact of physical loss/criticality (1.8)
- Replacement value (1.10)
- Operational redundancy (1.11)
- Terrorist threats: station (2.3.1)
- Function criticality within system/region (2.7)
- Flooding history (2.11)
- Station elevation (3.5)
- Integrated/adjacent parking (4.3)
- Overall structural condition (5.8)
- Protection of ventilation shafts (6.1)
- Ventilation hardware exposure (6.4)
- Backup power system (7.2)
- Overall security effectiveness
- Effectiveness of emergency plans (12.3)
- Effectiveness of mass evacuation plans (12.7)

### 2.5.1 Consequences, Threat, and Vulnerability

**A**s noted in Section 2.5.1, characteristics are grouped into the components of risk—consequences, threat, and vulnerability.

- As defined in the NIPP (DHS, 2009), consequence is the effect of an event, incident, or occurrence and reflects the level, duration, and nature of the loss resulting from the incident. Consequences are divided into four categories: public health and safety, economic, psychological, and governance/mission impacts.
- The category of **public health and safety** reflects the effect on human life and physical well-being (e.g., fatalities, injuries/illness). **Economic loss** includes direct loss (e.g., cost to rebuild an asset, cost to respond to and recover from the event) and indirect loss (e.g., costs resulting from the disruption of a product or service, long-term costs from environmental damage). The **psychological effect** refers to the effect on public morale, which includes the possible changes in the public's sense of safety and well-being after a significant event and possible subsequent aberrant behavior. The **governance/mission effect** is the effect on government's or industry's ability to maintain order, deliver minimum essential public services, ensure public health and safety, and carry out national security-related missions.
- The consequences that are considered in the IRVS are based on the criteria set forth in Homeland Security Presidential Directive 7 (HSPD-7), Critical Infrastructure Identification, Prioritization, and Protection. HSPD-7 establishes a framework to identify, prioritize, and protect CIKR from terrorist attacks and natural hazards, with an emphasis on protecting against catastrophic health effects and mass casualties.
- **Threat** is defined as a natural or manmade occurrence that harms or indicates the potential to harm life, information, operations, the environment, and/or property.
- **Vulnerability** is defined as a physical feature or operational attribute that renders a station open to exploitation or susceptible to a give hazard. Vulnerabilities may be associated with physical, cyber, or human factors. The assessment of vulnerabilities involves evaluation of specific threats to the asset to identify areas of weakness that could result in consequences of concern.



**Consequence** is the effect of an event, incident, or occurrence and reflects the level, duration, and nature of the loss resulting from the incident.

Consequences are divided into four categories: public health and safety, economic, psychological, and governance/mission impacts.

### 2.5.2 Subjective Judgments

Screeners may use subjective judgment when selecting attributes. The information in the catalog is intended in part to minimize the number of times the screener must use subjective judgment.

### 2.5.3 IRVS Catalog

The IRVS catalog contains the characteristics and associated attributes that are evaluated during the IRVS as well as information about the characteristics and attributes to help the screener. Characteristics are divided into consequences, threat, and vulnerability.

The catalog is essential in an IRVS assessment. The catalog is provided in Chapter 4 of this manual and also digitally in the IRVS database. See Section 2.5.5 for information about the IRVS database.

### 2.5.4 Electronic Data Collection Form

To prepare an IRVS assessment, the screener records the evaluation using the electronic Data Collection Form (DCF) in the IRVS Database (see Section 2.5.5). The screener may opt to use a paper version of the DCF (not recommended). If this is the case, information has to be transferred to the electronic version. The screener can input data into the electronic DCF using a laptop or tablet computer. The paper version is provided in Appendix D.

The first page of the DCF contains general station information and target density information (i.e., the number of high-value targets near the station). The subsequent pages of the DCF contain characteristics and attribute options for consequences, threat, and vulnerability. The attribute options are listed in order of least degree of risk to highest degree of risk.

See Chapter 4 for information on completing the DCF.

### 2.5.5 IRVS Database

The IRVS database is a user-friendly data collection and management tool that includes the IRVS catalog and the DCF. The database is a stand-alone application that runs on computers with MS Access. Reports are generated as text files or files that can be imported into MS Word or MS Excel for editing and formatting.

#### 2.5.5.1 Database Synchronization

The database can be accessed by multiple computers simultaneously. For example, screeners use the DCF in the database to record data in



the field, and a computer at an organization's headquarters analyzes the data and prints reports. The database is kept up-to-date using the import/export feature (see Appendix C) and by synchronizing the database through the authority's secure network.

#### 2.5.5.2 Use of the Database by Mass Transit Managers

The IRVS database can be used to facilitate the management of mass transit stations. Station managers can use vulnerability and risk data when considering the implementation of protective measures. During periods of high alert, the database can be used to identify which security measures should be put in place immediately.

### 2.5.7 Links

Some characteristics affect more than one risk component. For example, the number of riders affects both consequences and threat. As the number of riders increases, the consequences and threat ratings are both expected to increase. The number of riders is therefore linked to two risk components and has a similar effect on both components.

Some linked characteristics have different effects on risk components. For example, station elevation below the water table would increase flooding vulnerability while reducing collision vulnerability.

## 2.6 IRVS Risk and Resilience Scores

The IRVS generates scores for risk and resilience.

### 2.6.1 Risk Score

The risk score is based on the consequences, threat, and vulnerability ratings for each of the 12 threat scenarios. Consequences, threat, and vulnerability ratings are explained in Section 2.6.1.1, and threat scenarios are explained in Section 2.6.1.2.

#### 2.6.1.1 Consequences, Threat, and Vulnerability Ratings

The IRVS generates ratings for consequences, threat, and vulnerability.

- A **consequences rating** represents the degree of debilitation that would result from the incapacitation or destruction of an asset after a catastrophic event that causes injuries or fatalities, social and economic losses, and/or business interruption. Consequences are rated from the perspective of a mass transit station's stakeholders, not terrorists.

- The **threat rating** represents the likelihood that a transit station will be affected by a terrorist attack or natural disaster (fire or flooding) and that the losses will be catastrophic (fatalities, injuries, damage, or business interruption).
- The **vulnerability rating** is defined as the likelihood of damage and loss at a transit station as result of a terrorist attack or natural hazard (fire, flood). The vulnerability rating is a measure of the expected outcome in terms of casualties and business interruption after a terrorist attack or natural hazard event.

The vulnerability rating is the most important and in-depth part of the IRVS. Unlike consequences and threats, vulnerabilities can be controlled or mitigated by the stakeholder. The vulnerability rating is crucial for determining protective measures and corrective actions that can be designed or implemented to reduce the identified vulnerabilities.

### 2.6.1.2 Threat Types and Scenarios

In the IRVS, risk is assessed with respect to a threat scenario or set of scenarios. The IRVS includes an assessment of the risk of both terrorist attacks and selected natural hazards. Risks are divided into four categories: (1) blast, (2) chemical, biological, or radiological (CBR) attack, (3) fire, and (4) other. Each category is subdivided into three threat scenarios (see Table 2-1). The scenarios represent the location of the source of harm. All components of risk (i.e., consequences, threat, and vulnerability) are evaluated for each scenario.

Table 2-1: Threat Types and Threat Scenarios

Threat Type	Threat Scenario
Blast	Internal External (direct) External (collateral)
CBR	Internal (platforms/plaza/etc.) Internal (tunnel) External
Fire	Internal External Tunnel/Track/Smoke
Other	Flood Collision (grade/tunnel/elevated) Cyber

CBR = chemical, biological, or radiological



The threat types and threat scenarios are as follows:

■ **Blast**

- **Internal** – Intrusion into the transit station by a person or persons with the intent to attack the transit station with an explosive device.
- **External (direct)** – The use of an explosive device to attack the transit station from the exterior. The transit station is the primary target.
- **External (collateral)** – An attack with an explosive device on a target within 1000 feet of the transit station. For example, in a bomb explosion in a plaza adjacent to a transit station, the transit station is not the primary target but is susceptible to collateral effects (see Figure 2-3). The severity depends on the proximity to the target and the magnitude of the attack.

■ **Chemical, biological, or radiological (CBR) attack**

- **Internal (e.g., platform)** – Ground release of an airborne CBR agent inside the transit station (see Figure 2-4).
- **Internal (tunnel)** – Release of a CBR agent inside the tunnel of a transit system that serves the station.
- **External** – Ground release of an airborne CBR agent from outside the transit station.



Figure 2-3:  
Collateral effects of an attack on a nearby plaza could threaten the operations of the transit station

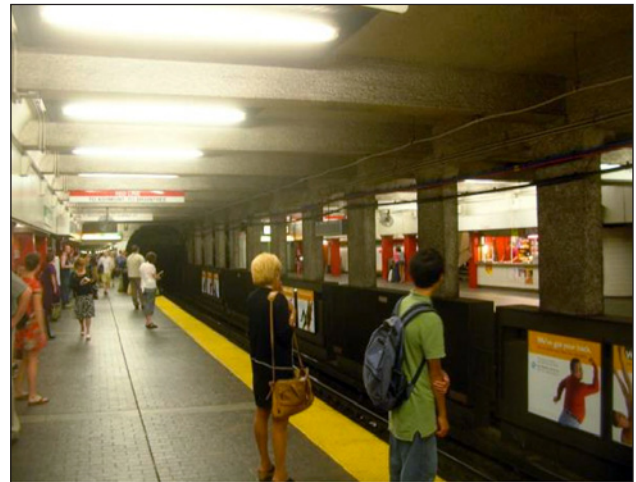


Figure 2-4:  
An explosive or CBR attack on the platform of a transit station is a threat scenario

### ■ Fire

- **Internal** – Fire inside the transit station that threatens the users and operations of the transit station.
- **External** – Fire outside the transit station that threatens the operations of the transit station. An example is a transit station that is next to or under a building that is on fire, and the fire threatens the operations and structure of the transit station.
- **Tunnel/Track/Smoke** – Fire or smoke in the tunnel that contains tracks and is connected to the transit station. The smoke threatens life safety, operations, and structure of the transit station.

### ■ Other

- **Flood/Flooding** – Event that causes the transit station to collect water and/or be submerged in water, threatening the users and operations of the station.
- **Collision** – Vehicular impact to the transit station that damages the structure and threatens operations.
- **Cyber** – Cyber attack on networks or control systems that affects any combination of facilities, equipment, procedures, and communications.

#### 2.6.1.3 Calculation of the Risk Score

The risk scoring procedure used in the IRVS is based on the risk assessment equation in P-426, *Reference Manual to Mitigate Potential Terrorist Attack Against Buildings* (DHS, 2011c) and the NIPP framework assessing risks (DHS, 2009b).

The procedure is as follows:

1. The consequences, threat, and vulnerability ratings are generated for each threat scenario.
2. The consequences, threat, and vulnerability ratings for each scenario are combined using the following equation to produce a risk score for the scenario (de-aggregated risk score).



$$\text{Risk} = C \times T \times V \quad (1)$$

where

**C = Consequences Rating** – degree of debilitation that would be caused by the incapacity or destruction of an asset. The consequences rating includes both monetary value and the value to a system or community.

**T = Threat Rating** – any indication, circumstance, or event with the potential to cause loss of, or damage to, an asset.

**V = Vulnerability Rating** – any weakness that can be exploited by an aggressor to make an asset susceptible to damage.

The de-aggregated risk score for each scenario ranges from 0.1 to 10. De-aggregated risk scores are color-coded as low (green), moderate (yellow), and high risk (red) in the IRVS database.

The de-aggregated risk score for each threat scenario provides more information about a station's risk to a specific threat than the overall risk (aggregated) score.

3. The 12 de-aggregated risk scores are combined using the statistical algorithm shown below to produce a single overall risk score (aggregated risk score) for the station.

$$R = \alpha \sqrt[n2]{\sum_{i=1}^{n1} R_i^{n1}} \quad (2)$$

 Equation

and

$$R_i = \sqrt[3]{C_i \times T_i \times V_i} \quad (3)$$

 Equation

where

$\alpha$  = scaling factor of 1/12

$R$  = aggregated (overall) risk

$n2$  = 12 (total number of threat scenarios)

$n1$  = 10 (power value)

$R_i$  = risk score of the  $i^{th}$  threat scenario

$C_i$  = consequences rating of the  $i^{th}$  threat scenario

$T_i$  = threat rating of the  $i^{th}$  threat scenario

$V_i$  = vulnerability rating of the  $i^{th}$  threat scenario

$C_i$ ,  $T_i$ , and  $V_i$  are all scaled to be in the range of 0.1 to 10. As such, the resulting risk score for the  $i^{th}$  threat scenario is also in the range of 0.1 to 10. The overall risk score (aggregated) is displayed as a percentage to indicate the level of risk associated with the station.

The risk score are color-coded as low (green), moderate (yellow), and high risk (red) in the IRVS database. Table 2-2 indicates the different levels of risk.

Table 2-2: Risk Levels

Risk Level	Risk Score
High	>66%
Moderate	33% to 66%
Low	<33%

### 2.6.2 Resilience Score

The characteristics in the IRVS cover most of the important issues that affect the resilience of a mass transit station. Each characteristic can affect the quality of performance (robustness), resourcefulness, and/or time and speed of recovery. Each attribute option for the characteristics that pertain to resilience is assigned a weight ranging from 0 to 10. The weight represents the importance of the attribute in the resiliency of the station. At the end of the assessment, all of the adjusted weights of the attributes that control quality of performance,  $Q_i$ , are summed. The quality of performance describes the ability of the station to maintain critical operations and function. Similarly, all of the adjusted weights of the characteristics that control recovery and resourcefulness, also known as the time measure,  $T_i$ , are summed. The time measure describes preparedness efforts (such as training, plans, and policies) and the ability to re-institute operations after a hazard event. The sum of  $Q_i$  and  $T_i$  are inserted into the following equations:

 Equation

$$Q_{TOTAL} = 10 \left( \frac{\sum_{i=1}^N Q_i}{\sum_{i=1}^N Q_i|_{MAX}} \right) \quad (4)$$

and

 Equation

$$T_{TOTAL} = 10 \left( \frac{\sum_{i=1}^N T_i}{\sum_{i=1}^N T_i|_{MAX}} \right) \quad (5)$$

where

$Q_{TOTAL}$  = scaled quality of performance

$T_{TOTAL}$  = scaled time measure

$Q_i$  = quality of performance (robustness)

$N$  = upper boundary (number of characteristics with a weight being summed)

$T_i$  = time measure (recovery and resourcefulness)

$Q_{i|MAX}$  = maximum quality of performance

$T_{i|MAX}$  = maximum time measure

$Q_{i|MAX}$  and  $T_{i|MAX}$  represent the maximum weighted values of the quality of performance and the recovery/robustness values, respectively. Now the values of  $Q_{TOTAL}$  and  $T_{TOTAL}$  represent a scaled, accurate measure of quality of performance and time measure that control resiliency (the two axes in Figure 1-1). The scale for both variables ranges from 0.01 to 10. The objective value of the station resilience is

$$RES = 100 - (Q_{TOTAL} T_{TOTAL}) \quad (6)$$



where

$$RES = \text{resilience}$$

Thus, a *RES* of 0% indicates there is no resilience in the station when affected by the postulated hazard. A *RES* of 100% indicates a perfect resilience in the station when affected by the postulated hazard.

Resilience scores can be used in decision-making and planning for hazardous events for the asset (station). These scores can also be used in planning for community (network) resiliency. Table 2-3 indicates the levels of resilience and how to interpret these levels.

Table 2-3: Resilience Levels

Resilience Level	Resilience Score	Description
High	>66%	The transit station has taken reasonable steps to maintain continuity of operations and/or has taken reasonable action to ensure that key functions will not be significantly affected by an event.
Medium	≥33%, ≤66%	The transit station has taken moderate steps to maintain continuity of operations and/or has taken moderate action to ensure that key functions will not be significantly affected by an event.
Low	<33%	The transit station has taken few or no steps to maintain continuity of operations and/or has taken little or no action to ensure that key functions will not be significantly affected by an event.

## 2.7 Other Considerations

### 2.7.1 Evaluating Risk for a Transit Station Connected to a Building

The IRVS methodology is designed for transit station structures only. Some stations may be connected to a building that is not part of the station (see Figure 2-5). When a transit station is connected to a building, each structure should be considered a separate structure. To evaluate the non-station building, the screener should use the IRVS of buildings (DHS, 2011a). Considerations of interconnections may be addressed through characteristics that focus on collateral effects associated with an attack.

Figure 2-5:  
Example of a transit station  
connected to a building



### 2.7.2 Evaluating Risk for Multiple Mass Transit Stations

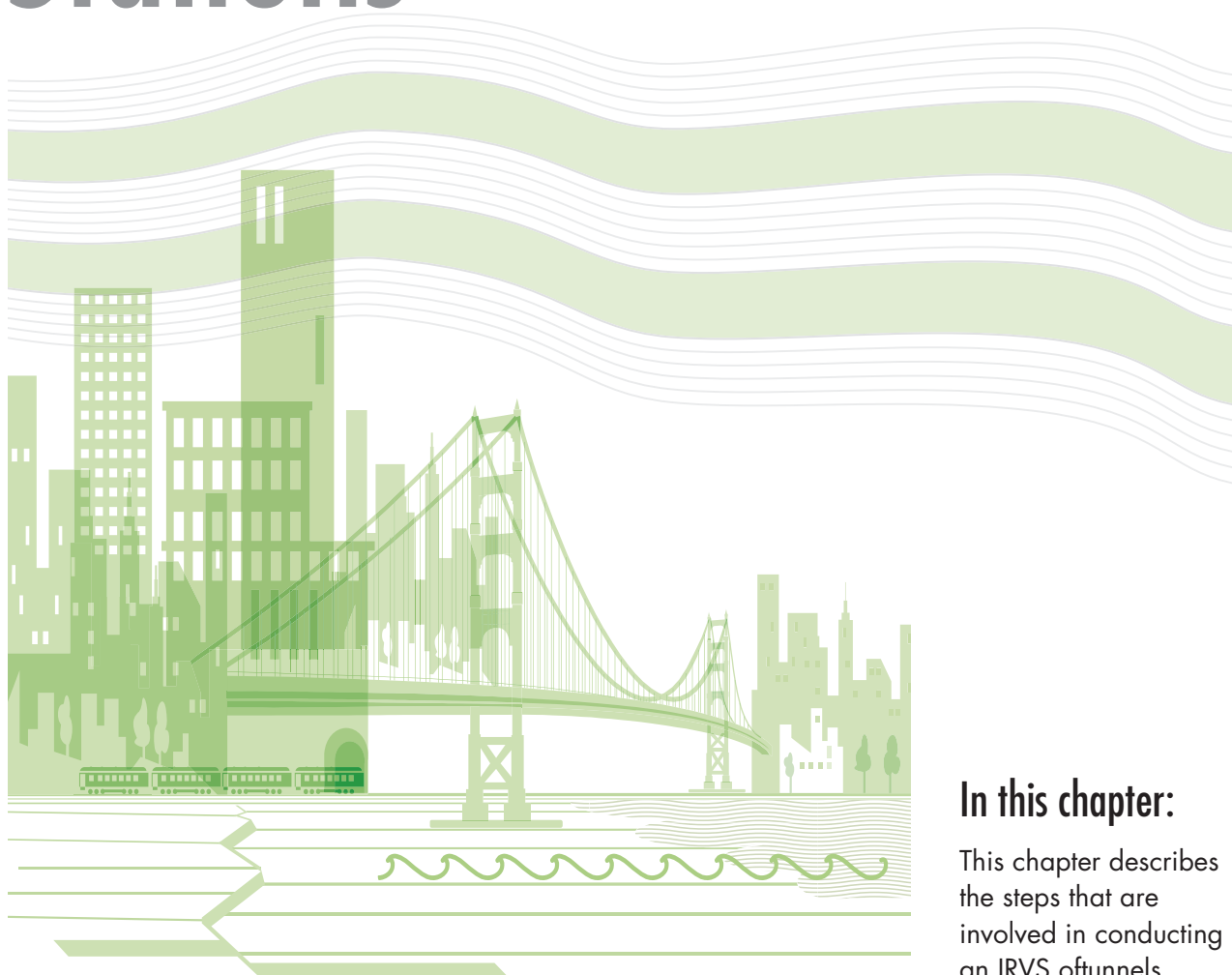
When two or more mass transit stations are adjacent to each other, a separate IRVS process should be performed for each station individually. Note that such proximity is reflected in several characteristics. For multiple stations in a mass transit system that are not adjacent to each other, a separate IRVS process is needed for each station.

### 2.7.3 Evaluating Risk for Interconnected Mass Transit Stations and Other Infrastructure

When other types of infrastructure are connected to the mass transit station being evaluated, such proximity is accounted for in several of the parameters within the IRVS process. As a rule, the larger the number of interconnecting infrastructures, the higher the risk score of the station.



# Conducting an IRVS of Mass Transit Stations



## In this chapter:

This chapter describes the steps that are involved in conducting an IRVS of tunnels.

**T**his chapter describes the steps that are involved in conducting an IRVS of mass transit stations (see Table 3-1). The IRVS process can be adjusted as needed.

Chapter 4 describes how to complete the Data Collection Form (DCF).

**Table 3-1: Steps in the IRVS of Mass Transit Stations**

<b>Pre-Field Activities</b>	<ul style="list-style-type: none"> <li>• Select the mass transit stations to be assessed</li> <li>• Identify the IRVS team</li> <li>• Train the IRVS team</li> <li>• Identify key objectives of the IRVS</li> <li>• Complete as much of the DCF as possible by reviewing publicly available information and available materials from transit authorities, including operations and security procedures, policies, and construction drawings</li> <li>• Identify the conditions for the field assessment</li> <li>• Set up a meeting with key staff and schedule the station tour</li> <li>• Assemble the equipment that is needed for the field assessment</li> </ul>
<b>Field Assessment</b>	<ul style="list-style-type: none"> <li>• Interview and meet with key staff and stakeholders</li> <li>• Tour the exterior and publicly accessible areas of transit station</li> <li>• Tour the critical areas of the interior of the station</li> <li>• Record data on the DCF</li> </ul>
<b>Post-Field Activities</b>	<ul style="list-style-type: none"> <li>• Transfer data from the paper version of the DCF to the electronic DCF if necessary</li> <li>• Use the scores in a variety of ways including identifying the transit stations that require a more detailed assessment</li> <li>• Summarize the results in a written report</li> </ul>

### 3.1 Pre-Field Activities

**T**he accuracy of the IRVS will be improved if the screeners obtain and review relevant information about the transit station prior to the field assessment and also review the IRVS methodology. A review of the IRVS methodology by the team of screeners for a group of stations (e.g., stations in one community) prior to the assessments will help ensure consistency among assessments, a high quality of collected data, and uniformity of decisions among screeners.



### 3.1.1 Selecting Mass Transit Stations To Be Assessed

The IRVS can be used to assess a single station or a group of stations within a transit system or region. The stakeholder typically selects the mass transit stations that will be assessed (see Section 2.2 for more information on the stakeholder). Budget is often a factor in the selection of stations for the IRVS.

### 3.1.2 Identifying the IRVS Team

The stakeholder or designee appoints the IRVS team leader who is responsible for identifying the IRVS team. The team leader should be familiar with risk assessment and transit systems. The IRVS team should include members who are knowledgeable about transit systems and security concepts and should include at least one individual familiar with structural engineering or construction and operations of a mass transit station.

The IRVS was developed so that screeners inside or outside the design community could conduct an IRVS with a reasonable level of certainty after brief training, thus reserving technical experts such as engineers and architects for more in-depth assessments. The more knowledgeable the screeners, the more accurate the assessment and, potentially, the more accurate the results. Training is recommended to ensure that the IRVS team understands the IRVS concepts. At a minimum, the IRVS team should review this manual.

### 3.1.3 Training the IRVS Team

Training should be required to ensure accuracy and uniformity of decisions among screeners. Training includes reviewing the IRVS methodology. The review should include:

- Station systems (e.g., site design; architectural, mechanical, electrical, plumbing, fire protection, security, and cyber systems)
- How to complete the DCF (see Chapter 4)
- How to use IRVS database (see Section 1.9 and Appendix C)
- What screeners should bring to the field assessment (see Section 3.9.1)
- What screeners should look for when performing the field assessment (See Section 3.2.2)
- How to account for uncertainty (see Section 4.2)

The training should also include a desktop exercise, which is a simulated IRVS conducted in a classroom using photographs of stations. The desktop exercise can be created by gathering photographs of and information about an actual station.

### 3.1.4 Identifying the IRVS Objectives

The stakeholders and IRVS team should determine the objectives of the assessment early in the pre-field activities. Examples of objectives are:

- Assessing a group of stations to determine which stations require more detailed analysis
- Plan protective measures for a special event that will increase ridership at the station and the attractiveness of the station as a target
- Evaluate the risk for a station during a period of high threat alert and to implement protective measures
- Prioritize a group of stations for mitigation
- Prepare a risk report of stations in a system in order to apply for grant funding

Objectives define outcomes and conditions of the assessment. For instance, if the objective is to evaluate the risk of a station during a period of high threat alert, the condition for the assessment will be worst case and the outcome will be to establish immediate protective measures to lower the risk score. Objectives can help determine the resources, time, and effort that are needed and how the risk and resiliency results will be used. If the objective includes assessing a group of stations, more time and effort will be needed than when only a single station is assessed. Objectives may vary across and within transit systems.

The goal of the IRVS is to enhance protection and resiliency through the implementation of focused risk-reduction strategies.

The goal of the IRVS is to enhance protection and resiliency through the implementation of focused risk-reduction strategies.

### 3.1.5 Evaluating Target Zones and Density

Two considerations when selecting a transit station for IRVS are the proximity of the station to other critical facilities and the presence of other high-profile targets near the station. Proximity of targets creates two possible scenarios of concern. In the first scenario, the station itself is the target, and collateral damage to nearby critical facilities will increase

damage and the severity of the attack. In the other scenario, the station is not the target, but there are high-profile targets near the station, and the station is subjected to collateral damage that varies in severity depending on the hardness of the structure, proximity to the target, and magnitude of the threat. In the IRVS, the concept of target density is part of the consequences, threat, and vulnerability ratings. The IRVS of mass transit stations is designed to address both target and non-target stations.

The IRVS of mass transit stations is designed to address both target and non-target stations.

In the IRVS, the following target zones are considered (see Figure 3-1):

- Zone 1 refers to an attack occurring less than 300 feet from the subject station.
- Zone 2 refers to an attack occurring at least 300 feet but not more than 1,000 feet from the transit station.

Information regarding the target density is collected on the first page of the DCF (see Section 4.2). The target density can be calculated using open source information such as Google maps or Bing maps. In addition, the IRVS database includes an application for plotting the target density rings in Google Earth (requires installation on a computer) using the coordinates of the station. The target density is calculated using the 18 CIKR Sectors that are identified in HSPD-7.

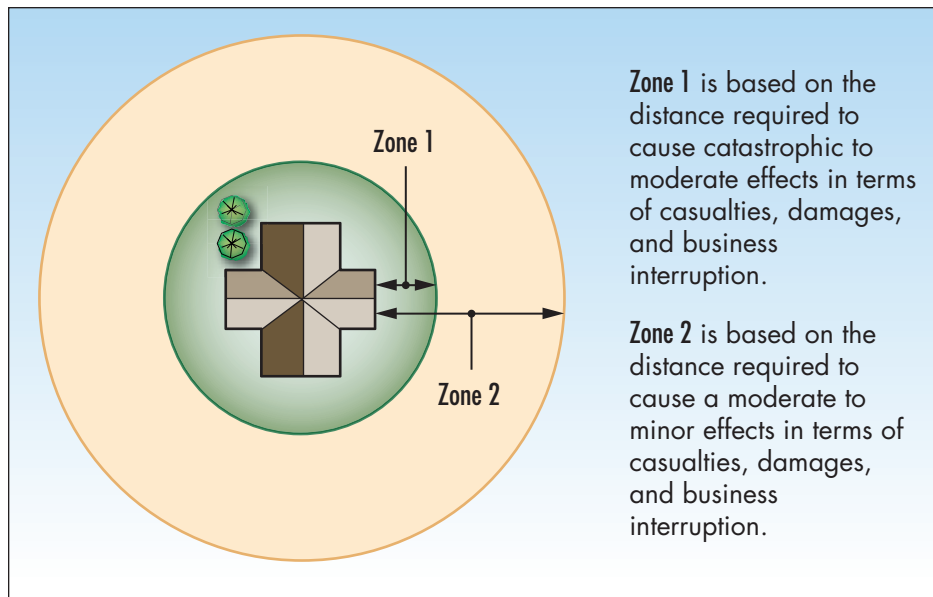


Figure 3-1:  
Target Zones 1 and 2

### 3.1.6 Gathering Pre-Field Data

The IRVS team should complete as much of the DCF as possible before the field assessment by reviewing publicly available information and information that is provided by the transit agency (e.g., operations and security procedures, policies, construction drawings). Electronic documents can be stored in the IRVS database as MS Word files or PDFs. Documents that are not available electronically can be scanned and imported into the database.

Examples of documents that can be useful are:

- Drawings for original design and any implemented modifications
- Prior vulnerability assessment data
- Emergency response and disaster recovery plans
- Security master plan
- Hazardous materials plans
- Site plans of utility and communications system
- Historical reports regarding the station
- Facility systems operational capability
- Reports of incident in the station (e.g., misconduct)

The IRVS team should also review emergency plans, policies, and procedures. These documents are useful in evaluating characteristics related to resilience. Examples of such documents are:

- Emergency notification procedures
- Emergency evacuation procedures
- First responder access and routing
- Shelter-in-place procedures
- Exercise of plans

The screener can also obtain information by conducting phone interviews of transit system authorities, stakeholders, and key station staff.

### 3.1.7 Identifying Conditions for the Field Assessment

IRVS results can be affected by the timing of the field assessment. For example, a station may have low ridership during the work week but high ridership during a special weekend event at a nearby venue (e.g.,

sporting event, concert, festival). Ridership is relevant to all three risk components (consequences, threat, and vulnerability). In addition, increased security for special events may reduce vulnerability and therefore the risk, but special events can also make normally non-high-profile stations attractive targets, thus increasing the threat.

To avoid variations that can distort the scores, the IRVS team and stakeholders should determine before the field assessment which conditions will be considered.

To avoid variations that can distort the scores, the IRVS team and stakeholders should determine before the field assessment which conditions will be considered. The two conditions are:

- Current “as-seen” conditions: The station is assessed for the situation and conditions present at the time of the screening.
- Worst-case or special event conditions: The combination of conditions that would make the most harmful results.

Physical conditions should be considered at their most disadvantageous state. Reasonable worst-case conditions are recommended when assessing the risk of a terrorist attack because intelligent adversaries can choose circumstances in which targets are vulnerable and consequences maximized (NIPP, 2009). The concept of worst case should be moderated by reason, however scenarios should not include numerous unlikely conditions unless the focus of the contingency and other types of planning is on rare or special events. On the other hand, scenarios should not be based simply on average conditions. Every station has different characteristics that need to be assessed to describe reasonable worst-case conditions accurately (i.e., the worst-case scenario is different for every station). The IRVS team and stakeholders should establish the conditions that will be considered.

### 3.1.8 Scheduling a Meeting with Key Staff and Stakeholders and Scheduling the Station Tour

The IRVS team should try to arrange a meeting or interview with key staff and stakeholders before or during the field assessment to review the information that was obtained before the field assessment. The IRVS team leader decides which key staff and stakeholders should be interviewed based on the composition of the team and the familiarity of the transit station or system. The team should prepare a list of questions before the meeting. Key personnel include:

- Chief of engineering
- Chief of security

- Chief of Information Technology
- Emergency manager
- Station transportation official/manager (station specific)

The station's transportation official/manager, who opens and closes the station, can provide a wealth of information. The manager knows all of the entrances, exits, mezzanines, and corridors throughout the station and should be able to answer questions about the vent systems, electrical systems, pump rooms, fire emergency panels, and security.

The IRVS team also needs to schedule the station tour. The IRVS team should plan which areas of the station (see Section 3.2.2) need to be viewed and obtain the proper permissions to survey the station.

### 3.1.9 Assembling the Equipment for the Field Assessment

The screener should take the following to the field assessment:

- A laptop or tablet loaded with the IRVS database, which contains the DCF and catalog. The database user guide is included in this manual as Appendix C.
- The paper version of the DCF if a laptop or tablet is not available. The paper version is included in this manual as Appendix D.
- A digital camera for photographing the station.

## 3.2 Field Assessment

**T**he field assessment is an onsite visit to the mass transit station to record and/or verify information that has already been recorded on the DCF. The visit includes interviewing key personnel and stakeholders and touring the station.

### 3.2.1 Interviewing Key Staff and Stakeholders

Interviews with key staff and stakeholders can be conducted in person during the field assessment. The screener can record the information electronically or on a notepad. Key station staff or stakeholders may be part of the IRVS team or participate in the field assessment.

### 3.2.2 Touring the Station

The IRVS team should tour the exterior of the station, publicly accessible areas, and internal, secure areas of the station. The locations the assessor should tour, if applicable, are:

- Perimeter of station or site
- Main lobby or entryway
- Emergency exits
- Station lighting
- Vent systems
- Electrical/power systems
- Pump rooms
- Fare collection area
- Mezzanine levels
- Concourses
- Retail areas
- Platforms
- Entrance security and security rooms
- Parking

## 3.3 Post-Field Activities

The following activities are typically conducted after completing the DCF and the field assessment.

### 3.3.1 Transferring Data to the IRVS Database

If the paper version of the DCF is used, the information must be transferred to the IRVS database in order to generate the risk and resiliency scores. Any photographs taken during the field assessment should be imported into the database.

### 3.3.2 Using the IRVS Scores

The IRVS of MTS is a quick and simple tool for obtaining a preliminary risk and resilience assessment. IRVS results can be used to:

- Identify the stations that require a more detailed assessment

- Prioritize stations for further evaluation
- Develop emergency preparedness plans for high-threat alerts
- Plan post-event evacuation, rescue, recovery, and safety evaluation efforts
- Prioritize mitigation needs
- Conduct a “what if” exercise by selecting different attributes to see how the scores are affected
- Compare the scores of various threat scenarios to identify the relative exposure of the station to different threats. Risk scores for different scenarios can be compared
- Develop transit station-specific vulnerability information

### 3.3.3 Identifying Mass Transit Stations That Require Further Analysis

Depending on the objectives of the IRVS assessment, the IRVS team and stakeholders may identify stations that require further analysis (a more detailed assessment). The risk and resiliency scores from the IRVS assessment can be used to determine the need for a more detailed assessment. The IRVS team and stakeholders must decide the levels of risk and resilience that are unacceptable for a particular transit system based on the conditions of the system (e.g., size, locality, number of riders, performance objectives). Unacceptable levels trigger a more detailed assessment.

Generally, risk and resilience can be interpreted as unacceptable when the risk score is above 70% and the resilience score is below 30%.

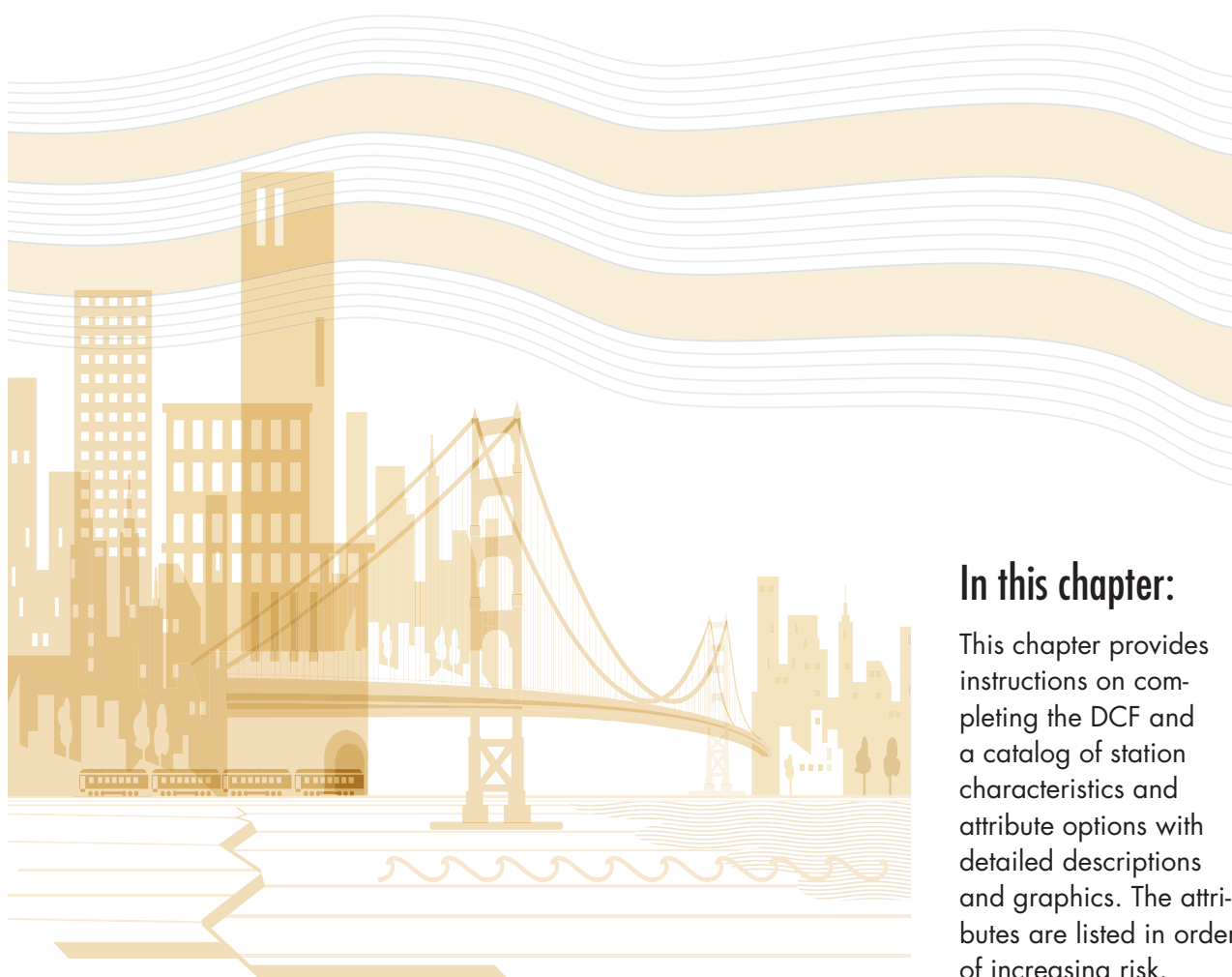
### 3.3.4 Preparing a Written Report

The IRVS database can be used to generate a generic report for one station or a group of stations. The report includes the information that was input into the database and the risk and resiliency scores. The report is generated as an MS Word document and can be edited by the IRVS team.



# 4

# Completing the Data Collection Form



## In this chapter:

This chapter provides instructions on completing the DCF and a catalog of station characteristics and attribute options with detailed descriptions and graphics. The attributes are listed in order of increasing risk.

Information that is collected during the IRVS is recorded electronically on the Data Collection Form (DCF) or on paper using the paper version of the DCF. The screener can input data into the DCF using a laptop or tablet computer. If the paper version is used, the information has to be transferred to the electronic version, so using the electronic version is more efficient. The paper version is provided in Appendix D.

This chapter provides instructions on completing the DCF and a catalog of station characteristics and attribute options with detailed descriptions and graphics. The attributes are listed in order of increasing risk.

The DCF is typically completed during the field assessment, but it can also be completed before or after the field assessment.

- **Before the field assessment** – The DCF is completed collectively by the IRVS team and key personnel during a desktop workshop, and the information is verified during the field assessment. Completing the DCF before the field assessment is typically done by screeners who are familiar with the station or when the available information makes it possible.
- **During the field assessment** – The DCF is completed during the field assessment either electronically or using the paper version.
- **After the field assessment** – The IRVS team records observations, conducts interviews, and takes pictures during the field assessment. After returning from the field assessment, the IRVS team collectively completes the DCF.

The DCF should be completed according to the station conditions that have been selected (see Section 3.1.6). Screeners should document the assessment as completely as possible to optimize the accuracy of the risk and resiliency scores.

## 4.1 Accounting for Uncertainty

The accuracy of the risk and resiliency scores rely on an accurate and thorough completion of the DCF. All characteristics must be evaluated before risk and resiliency scores can be calculated. If a screener is unsure which attribute is correct for a particular characteristic, the screener should document observations using the comments tab and should do one of the following:

- Select “Not Applicable” when available

The accuracy of the risk and resiliency scores rely on an accurate and thorough completion of the DCF.


- Make an educated guess based on professional or engineering judgment
- Select the attribute that is most common in other similar stations in the system

Where two or more attributes for one characteristic could be selected, the screener should select the dominant attribute. When one attribute is not clearly dominant and an educated guess is not possible because not enough information is available, the screener should select the attribute with the highest risk. The number of times a screener is uncertain about which attribute to select should be minimal.

## 4.2 Page One of the DCF

The first page of the DCF includes station identification, historical information about the station, and target density. Station identification is especially important when a group of stations are assessed. The electronic version of page 1 is shown in Figure 4-1, and the paper version is shown in Figure 4 2.

iRVS Site Record

Facility Name \*:  Default Facility Image:  

Facility ID#:  Facility Descriptive Text:

Org. Name:

Address1:

Address2:

City:  St:

Zip:  Sector:  Facility Importance:

Site Type:  Subsector:

Assessment(s)  Coordinates:

Assessment Folder Name: C:\RVS\1\Subway\Assessment\_01\_2011-03-23\

Assessment Number	Assessment Date *	Assessment Comments / Notes	Assessment Folder Name	Entered By
01	3/23/2011		Assessment_01_2011-03-23\	Assess

Create additional (blank) assessment record for this site  Create a duplicate of Assessment [01] including scoring

Record: 1 of 1  No Filter  Search

\* Required Field(s) For Help, Press the F1 Key

Figure 4-1:  
Data Collection Form, page 1

### Pre-Field Information

Complete the information on this page before the field assessment, using additional sheets as needed. The numbers in parentheses refer to the ID number in the catalog. Refer to the catalog for explanations of the information that is requested on this page and the potential sources of the information.

Station name/identification \_\_\_\_\_  
 Address/intersection \_\_\_\_\_  
 Transit agency \_\_\_\_\_  
 Year built \_\_\_\_\_ Footprint (in square feet) \_\_\_\_\_  
 Overview of the station from the transit agency \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Number of tracks (1.1) \_\_\_\_\_ Number of levels (1.2) \_\_\_\_\_  
 Station elevation (1.3) \_\_\_\_\_ Replacement value (1.10) \_\_\_\_\_  
 Peak daily ridership/transfers (1.4) \_\_\_\_\_  
 Terrorist threats against the station (2.3) \_\_\_\_\_  
 \_\_\_\_\_  
 Terrorist threats against the transit system (2.4) \_\_\_\_\_  
 \_\_\_\_\_  
 History of flooding affecting the station since opening (2.11) \_\_\_\_\_  
 \_\_\_\_\_  
 Geology: Soil conditions (3.9) \_\_\_\_\_  
 Year(s) of major retrofits (5.3) \_\_\_\_\_  
 Retrofit description \_\_\_\_\_  
 Operating hours (12.8) \_\_\_\_\_

**Target Density.** Number of potential high-value/CIKR targets/buildings within 300 feet and between 300 and 1000 feet of any point of the perimeter of the station (1.7).

CIKR Sector	Within 300 feet	From 300 to 1000 feet
Agriculture and Food		
Banking and Finance		
Chemical		
Commercial Facilities		
Communications		
Critical Manufacturing		
Dams		
Defense Industrial Base		
Emergency Services		
Energy		
Government Facilities		
Healthcare and Public Health		
Information Technology		
National Monuments/Icons		
Nuclear Reactors, Materials, and Waste		
Postal and Shipping		
Transportation Systems		
Water		
<b>TOTAL</b>		

Figure 4-2: Data Collection Form (paper version), page 1

## 4.3 Step One: Consequences Rating

### 4.3.1 Consequence Ratings Characteristics

Consequences are related primarily to the use, occupancy (the function of the building or infrastructure), and importance of the transit station from the owner's perspective. Rating consequences involves assessing the following station characteristics:

- Number of tracks
- Number of station levels
- Station elevation
- Peak number of riders/transfers per day
- Station locality

- Adjacent/nearby transportation systems or public assembly venues
- High-value targets/CIKR
  - Zone 1 (within 300 feet of the station)
  - Zone 2 (between 300 and 1,000 feet of the station)
- Impact of physical loss/criticality
  - Station
  - Tracks
- Social impact
- Replacement value (fair market value)
- Operational redundancy
- Estimate downtime after a major disaster

Information used to determine the consequence rating typically comes from the owner/operator, government sources, municipalities, and publicly accessible sources. This information should be gathered before the field assessment or during interviews with key personnel (see Section 3.2.1).


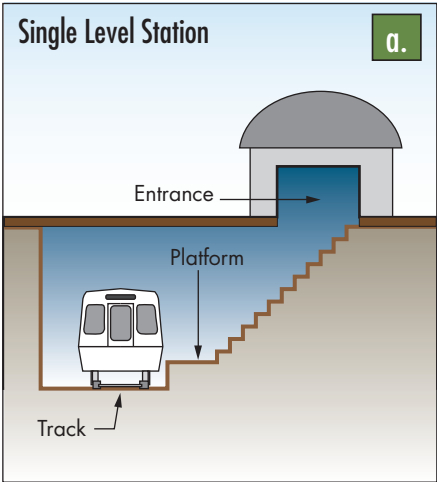
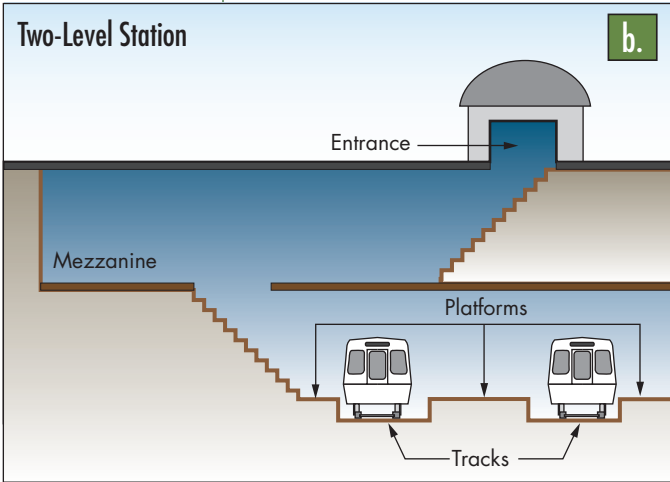
### 4.3.2 Catalog of Station Characteristics and Attribute Options for the Consequences Rating

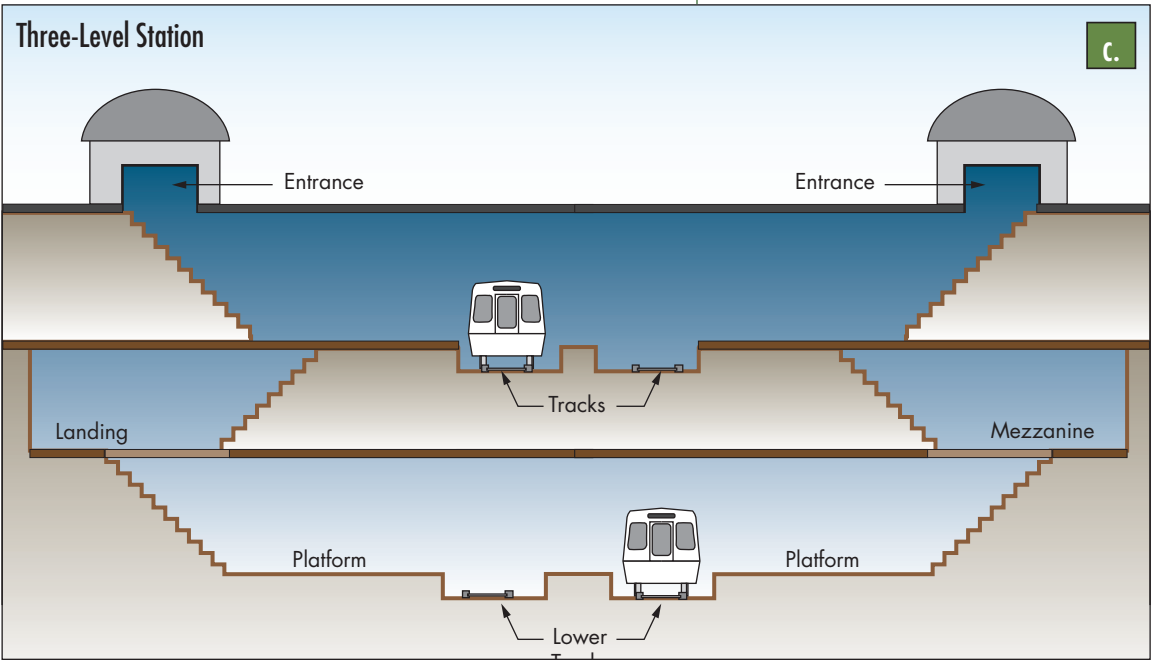

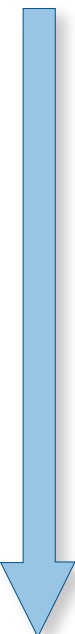
The catalog of consequence characteristics and attribute options is provided in Table 4-1. The catalog is also part of the IRVS database. The ID number in the catalog corresponds to the number of the characteristic in the DCF. The screener should use the catalog as a reference, as needed, when evaluating the characteristics.






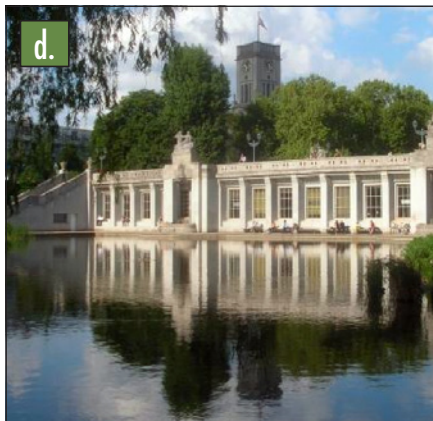
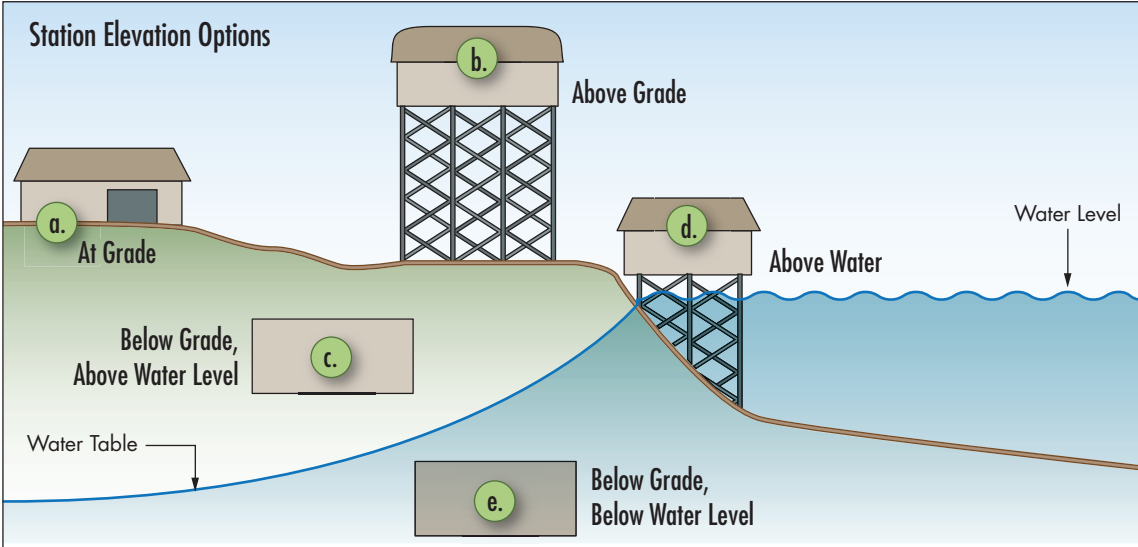
Information used to determine the consequence rating typically comes from the owner/operator, government sources, municipalities, and publicly accessible sources.

Table 4-1: Catalog of Station Characteristics and Attribute Options for the Consequences Rating

1. Consequence Rating		
ID	Station Characteristics	Attribute Options
1.1	<p><b>Number of Tracks</b></p> <p>Number of operating rail tracks or bus lanes, including express tracks that do not stop at a given station and layover tracks used for train storage. Five or more tracks are typical in large railroad stations, terminals, and maintenance yards. Abandoned tracks or tracks not used for regular service/storage should not be counted.</p>  <p><i>c. A three-track line, with the center track facilitating peak-direction rush hour express service.</i></p>	<p>a. 1</p> <p>b. 2</p> <p>c. 3 to 4</p> <p>d. 5 to 8</p> <p>e. More than 8</p>
1.2	<p><b>Number of Station Levels</b></p> <p>Number of levels open to the public, including platforms, lobbies, concourses/mezzanines, fare control areas, transfer passageways, service, and other areas in the station. For below-grade stations, the street level should not be considered unless the station has features that make it an attractive target at this level.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Single Level Station</b></p>  </div> <div style="text-align: center;"> <p><b>Two-Level Station</b></p>  </div> </div>	<p>a. 1</p> <p>b. 2</p> <p>c. 3</p> <p>d. More than 3</p>



1. Consequence Rating		
ID	Station Characteristics	Attribute Options
	<p>Number of Station Levels (continued)</p>  <p><b>Three-Level Station</b></p>	
1.3	<p><b>Station Elevation</b></p> <p>Elevation in relation to the prevailing street level or surrounding area.</p>  <p><i>a. An at-grade station</i></p>	<p><b>Least Risky</b></p>  <ul style="list-style-type: none"> <li>a. <b>At grade.</b> At street level. Typically located outside central cities.</li> <li>b. <b>Above grade.</b> Above the prevailing grade or street level. Typically built on steel platforms, concrete viaducts, or masonry structures.</li> <li>c. <b>Below grade, above water table.</b> Below street level or prevailing natural features. Typically subway or open-air stations below the street level.</li> <li>d. <b>Above water.</b> Typically on bridges or viaducts.</li> <li>e. <b>Below grade, below water table</b></li> </ul> <p><b>Most Risky</b></p>



1. Consequence Rating		
ID	Station Characteristics	Attribute Options
1.3	 <p><b>b.</b> <i>Elevated station on a steel structure over an active roadway.</i></p>  <p><b>c.</b> <i>Entrance to a below-grade subway station.</i></p>	  <p><b>d.</b> <i>Station above water.</i></p>
<p><b>Station Elevation Options</b></p>  <p>The diagram illustrates five station elevation options relative to ground level, water table, and water level:</p> <ul style="list-style-type: none"> <li><b>a. At Grade:</b> Station is at ground level.</li> <li><b>b. Above Grade:</b> Station is elevated on a steel structure above ground level.</li> <li><b>c. Below Grade, Above Water Level:</b> Station is below ground level but above the water table.</li> <li><b>d. Above Water:</b> Station is elevated on a steel structure above the water level.</li> <li><b>e. Below Grade, Below Water Level:</b> Station is below ground level and below the water level.</li> </ul> <p>Labels in the diagram include: Water Table, Water Level, and the specific station options a through e.</p>		



1. Consequence Rating		
ID	Station Characteristics	Attribute Options
1.4	<p><b>Peak Number of Riders/Transfers per Day</b></p> <p>Number of people who embark and disembark at a transit station on a peak day. Most transit authorities provide ridership reports to the public via the Internet. The screener should research this characteristic during the pre-field assessment. When ridership information is not available, the screener will have to estimate the number of riders per day.</p> <p>The screener should take into account the number of people transferring from one line to another (i.e., riders who switch from one line to another and do not exit the station) when this information is available. However, because ridership data are normally calculated by counting the number of people entering and exiting the station, accounting for the number of transfers is difficult.</p>	<p><b>Low ridership (in riders per day):</b></p> <ul style="list-style-type: none"> <li>a. Less than 1,000</li> <li>b. 1,000 to 2,000</li> <li>c. 2,000 to 5,000</li> <li>d. 5,000 to 10,000</li> <li>e. 10,000 to 20,000</li> </ul> <p><b>High ridership (in riders per day):</b></p> <ul style="list-style-type: none"> <li>f. 20,000 to 50,000</li> <li>g. 50,000 to 100,000</li> <li>h. 100,000 to 150,000</li> <li>i. 150,000 to 200,000</li> <li>j. More than 200,000</li> </ul>
1.5	<p><b>Station Locality</b></p> <p>General population density and land use in the area surrounding the station.</p> <p>The screener should consider the time of day the locality is at its peak activity. For instance, the peak activity in a business district may occur during the morning rush hour; this location should be described as urban or dense urban.</p> <div data-bbox="324 1297 990 1797" data-label="Image"> </div> <p><i>a. Rail station on park land</i></p>	<ul style="list-style-type: none"> <li>a. <b>Remote.</b> Sparsely populated area, such as park land.</li> <li>b. <b>Rural.</b> Low ratio of inhabitants to open land or farm land, or an outlying part of a city or town.</li> <li>c. <b>Urban.</b> Urban neighborhood or metropolitan area in a city or large town.</li> <li>d. <b>Dense urban.</b> Densely populated area in a city or major metropolitan area with clusters of commercial, retail, and residential buildings and congested streets. An explosive attack in a dense urban location has a significant potential resulting in collateral consequences to people on the street, in vehicles, and in surrounding structures.</li> </ul>

1. Consequence Rating		
ID	Station Characteristics	Attribute Options
	 <p><b>c.</b> A transit station in an urban neighborhood outside a city center</p>	 <p><b>d.</b> Transit station in a dense entertainment, commercial, retail, and office district where high rises and other large buildings are predominant</p>
1.6	<p><b>Adjacent/Nearby Transportation Systems or Public Assembly Venues</b></p> <p>Any transportation system (stations, structures, or modes) or public assembly venue that is above, below, or within 300 feet of the station. Bus stops are not included.</p> <p>Public assembly venues include:</p> <ul style="list-style-type: none"> <li>• Amphitheater</li> <li>• Arena</li> <li>• Convention center</li> <li>• Museum</li> <li>• Performing arts center/auditorium</li> <li>• Shopping mall</li> <li>• Stadium</li> </ul>	<p>a. <b>None.</b> No other transportation systems or public assembly venues are within 300 feet of any part of the station.</p> <p>b. <b>Close.</b> Another transportation system or public assembly venue is within 300 feet of the station but is not connected.</p> <p>c. <b>Tightly integrated.</b> The station is connected to either another transportation system or a large public assembly facility through tunnels, passageways, the structure, or other connections</p>

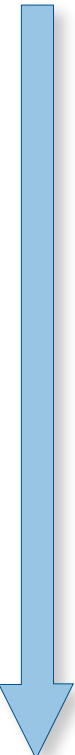
1. Consequence Rating		
ID	Station Characteristics	Attribute Options
1.7	<p><b>High-Value/CIKR Targets</b></p> <p>A high-value/CIKR target is any structure or asset the incapacitation or destruction of which would have a debilitating impact on the security, economy, public health or safety, and/or environment across any Federal, State, regional, territorial, or local jurisdiction.</p> <p>The 18 Critical Infrastructure and Key Resources (CIKR) sectors defined by DHS for evaluating target density are listed below and are available in the DCF and also in DHS (2009). Subsectors should also be reviewed for this characteristic.</p> <p><b>CIKR Sectors</b></p> <ul style="list-style-type: none"> <li>• Agriculture and Food</li> <li>• Banking and Finance</li> <li>• Chemical</li> <li>• Commercial Facilities</li> <li>• Communications</li> <li>• Critical Manufacturing</li> <li>• Dams</li> <li>• Defense Industrial Base</li> <li>• Emergency Services</li> <li>• Energy</li> <li>• Government Facilities</li> <li>• Healthcare and Public Health</li> <li>• Information Technology</li> <li>• National Monuments and Icons</li> <li>• Nuclear Reactors, Materials and Waste</li> <li>• Postal and Shipping</li> <li>• Transportations Systems</li> <li>• Water</li> </ul>	<p>High-value/CIKR targets are divided into two zones for this characteristic according to the distance of the target from any point of the perimeter of the station. Zone 1 is within 300 feet of any point of the perimeter of the station, and Zone 2 is between 300 feet and 1,000 feet of any point of the perimeter of station. In most cities, 300 feet is equal to approximately 1 block, and 1,000 feet is equal to approximately 3 blocks.</p> <p><b>Zone 1.</b> Number of targets within 300 feet of any point of the perimeter of the station.</p> <p>a. None b. 1 to 6 c. 7 to 12 d. 13 to 19 e. 20 or more</p> <p><b>Zone 2.</b> Number of targets between 300 feet and 1,000 feet of any point of the perimeter of station.</p> <p>a. None b. 1 to 6 c. 7 to 12 d. 13 to 19 e. 20 or more</p>

A subway station adjacent to an interstate highway, a CIKR

**Zone 1** – Within 300 feet of the perimeter of the structure

**Zone 2** – Within 1,000 feet of the perimeter of the structure

1. Consequence Rating										
ID	Station Characteristics	Attribute Options								
1.8	<p><b>Impact of Physical Loss/Criticality</b></p> <p>Extent to which loss of or serious damage to the station would affect the livelihood and resources of individuals and businesses in the local, regional, and national community. Criticality refers to the importance of the station to the system or region. Partial or complete physical loss of a station from a terrorist attack or natural disaster would have economic consequences (direct loss such as the cost to rebuild an asset and cost to respond to and recover from the event and indirect loss such as the costs resulting from the disruption of a product or service and long-term costs from environmental damage). The impact of physical loss includes consequences from the loss of a facility above or connected to the transit station. For this characteristic, the economic impact of physical loss should be evaluated for two scenarios:</p> <ul style="list-style-type: none"> <li>• Loss of the station</li> <li>• Loss of the tracks</li> </ul> <p>The impact of the physical loss of the actual station and loss of the tracks are different because of the direct and indirect losses associated with the loss of the station. The loss of the station would be direct. The loss of the tracks could be indirect if the tracks are shared by other authorities, and a major corridor for multiple systems is interrupted.</p> <p>The attribute options define the geographic limits of the economic impact of the loss of a station.</p> <div style="text-align: center;"> <pre> graph TD     A[Economic Impact of Physical Loss] --&gt; B[Direct Losses]     A --&gt; C[Indirect Losses]     B --&gt; B1[• Cost to rebuild asset]     B --&gt; B2[• Cost to respond and recover from an event]     B --&gt; B3[• Loss of revenue]     C --&gt; C1[• Long-term economic effects on the local, regional, or national community]     C --&gt; C2[• Downstream costs resulting from disruption of the service after an event]     C --&gt; C3[• Long-term costs due to environmental damage]           </pre> </div>	<table border="1" style="margin-bottom: 10px;"> <thead> <tr> <th>Station</th> <th>Local</th> <th>Regional</th> <th>National</th> </tr> </thead> <tbody> <tr> <td>Tracks</td> <td>Local</td> <td>Regional</td> <td>National</td> </tr> </tbody> </table> <p>a. <b>Local.</b> The station has little, if any, importance to maintaining the transit system's service levels, mobility with respect to the regional transportation system, and the local and regional economy. The regional transit system would be minimally affected, and regional authorities would be able to route passengers around distressed areas easily.</p> <p>b. <b>Regional.</b> Loss of the station would substantially affect the transit system and force passengers to find alternative transportation, which would result in increased congestion-related environmental and employment costs locally and in the region.</p> <p>c. <b>National.</b> Loss of the station would severely strain the regional transit system, and movement around the region via other modes would be disrupted significantly, resulting in extreme social and economic costs nationally</p>	Station	Local	Regional	National	Tracks	Local	Regional	National
Station	Local	Regional	National							
Tracks	Local	Regional	National							

1. Consequence Rating		
ID	Station Characteristics	Attribute Options
1.9	<p><b>Social Impact</b></p> <p>Psychological effect on public morale and confidence in the transit system. Social impacts of loss include the decrease in the public's mobility, lack of confidence in the transit system, and environmental impacts. Included are changes in the public's sense of safety and well-being after a significant event and possible subsequent aberrant behavior.</p>	<p>a. <b>Low.</b> There will be little or no effect on daily life in the region served by the transit system.</p> <p>b. <b>Moderate.</b> A substantial number of people will stop using the transit system.</p> <p>c. <b>High.</b> Transit use in the affected region will be severely disrupted.</p>
1.10	<p><b>Replacement Value (Fair Market Value)</b></p> <p>Current market cost to construct a station. Replacement value depends on the construction costs in the region.</p> <p>Replacement value information is obtained before the field assessment and is on page 1 of the Data Collection Forms. This information should be obtained from a knowledgeable site representative. If this is not possible, the value must be estimated using qualitative guidance for construction costs.</p> <p><b>Least Expensive</b></p>  <ul style="list-style-type: none"> <li>• Simple at-grade and open-air station consisting of a simple concrete platform and few structural elements</li> <li>• Typical above-ground station with lobbies, elevators, and other major structural elements</li> <li>• Simple below-grade station without elevators; escalators; or heating, ventilation, and air conditioning (HVAC) systems; and no lobby or small lobby</li> <li>• Below-grade station with elevators, escalators, large lobbies, HVAC systems, and other structural elements</li> <li>• Large station with multiple lines and platforms, elevators, escalators, HVAC systems, and a large lobby</li> <li>• Station with complex site-specific conditions, such as soil conditions or other complex surrounding infrastructure</li> <li>• Largest and most complex station, such as Times Square, with four or more connecting trunk lines, numerous entrances and exits, elevators, escalators, and interior retail locations</li> </ul> <p><b>Most Expensive</b></p>	<p>a. Less than \$1 million (m)</p> <p>b. \$1 m to \$5 m</p> <p>c. \$5 m to \$20 m</p> <p>d. \$20 m to \$50 m</p> <p>e. \$50 m to \$100 m</p> <p>f. \$100 m to \$200 m</p> <p>g. \$200 m to \$350 m</p> <p>h. \$350 m to \$600 m</p> <p>i. \$600 m to \$900 m</p> <p>j. More than \$900 m</p>

1. Consequence Rating		
ID	Station Characteristics	Attribute Options
1.11	<p><b>Operational Redundancy</b></p> <p>The degree to which a transit system is able to maintain a reasonable service level by routing passengers around a distressed station, either by sharing tracks with other lines, bussing, or some other means of transportation.</p>	<ul style="list-style-type: none"> <li>a. <b>Very high.</b> Few, if any, disruptions would result from a problem at the station, and the local transit provider would be able to reroute transit services.</li> <li>b. <b>High.</b> Some passengers would be affected, but most transit operations would be able to continue, with service routed around the troubled station without any disruptions.</li> <li>c. <b>Moderate.</b> Many passengers would be affected, but the transportation system would be functional with few delays for the majority of customers.</li> <li>d. <b>Low.</b> Few, if any, alternative service routes to the station exist; failure of the station would cause system delays, nearly crippling mass transit operations.</li> <li>e. <b>Very low.</b> Failure of the station would cripple mass transit in the region and cause rail transit operations to halt.</li> </ul>
1.12	<p><b>Estimated Downtime after a Major Disaster</b></p> <p>The resiliency of the station to a major disaster is estimated by the amount of time needed for the transit station to recover fully and be operational after a disaster.</p>	<ul style="list-style-type: none"> <li>a. <b>Very short.</b> Less than a day</li> <li>b. <b>Short.</b> Less than a week</li> <li>c. <b>Moderate.</b> Less than a month</li> <li>d. <b>Long.</b> Less than a year</li> <li>e. <b>Very long.</b> More than a year</li> </ul>



## 4.4 Step Two: Threat Rating

**T**his section contains (1) a description of the station characteristics that are assessed to determine the threat rating and (2) the catalog of threat characteristics and attribute options.

### 4.4.1 Threat Rating Characteristics

The threat rating is a function of the following transit station characteristics:




- Station locality
- Peak number of riders/transfers per day
- History of planned, thwarted, or successful terrorist attacks
  - Station
  - Transit system
- High value targets/CIKR
  - Zone 1 (within 300 feet of the station)
  - Zone 2 (between 300 and 1,000 feet of the station)
- Significance of station
- Function criticality within the system/region
- Number of entrances/exits
- Plaza/public areas
- Protective deterrence measures
- Accessibility of off-duty vehicles/equipment
- Flooding history

The transit station characteristics that are the same for the consequence and threat ratings are station locality, peak number of riders/transfers, and high-value targets/CIKR. In the IRVS database, these characteristics are automatically selected after they are input in the consequence section of the DCF.

### 4.4.2 Catalog of Station Characteristics and Attribute Options for the Threat Rating


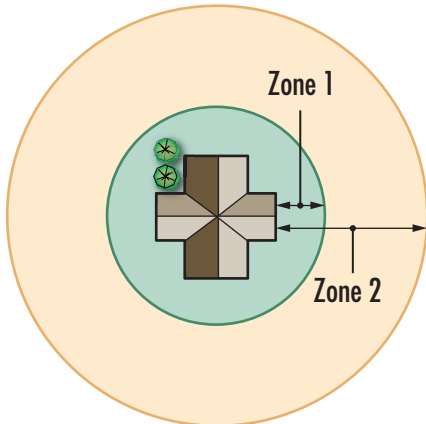
The catalog of threat characteristics and attribute options is provided in Table 4.2. The catalog is also provided electronically in the IRVS database. The ID number in the catalog corresponds to the number of the characteristic in the DCF. The screener should use the catalog as a reference, as needed, when evaluating the characteristics on the DCF.




Table 4-2: Catalog of Station Characteristics and Attribute Options for the Threat Rating


2. Threat Rating		
ID	Station Characteristics	Attribute Options
2.1	<p><b>Station Locality</b></p> <p>General population density and land use in the area surrounding the station.</p> <p>The screener should consider the time of day the locality is at its peak activity. For instance, the peak activity in a business district may occur during the morning rush hour; this location should be described as urban or dense urban.</p>  <p><i>a. Rail station on park land.</i></p>  <p><i>c. Transit station in an urban neighborhood outside a city center.</i></p>	<ul style="list-style-type: none"> <li>a. <b>Remote.</b> Sparsely populated area, such as park land.</li> <li>b. <b>Rural.</b> Low ratio of inhabitants to open land or farm land, or an outlying part of a city or town.</li> <li>c. <b>Urban.</b> Urban neighborhood or metropolitan area in a city or large town.</li> <li>d. <b>Dense urban.</b> Densely populated area in a city or major metropolitan area with clusters of commercial, retail, and residential buildings and congested streets. An explosive attack in a dense urban location has a significant potential to result in collateral consequences to people on the street, in vehicles, and in surrounding structures.</li> </ul>  <p><i>d. Transit station in a dense entertainment, commercial, retail, and office district where highrises and other large buildings are predominant.</i></p>



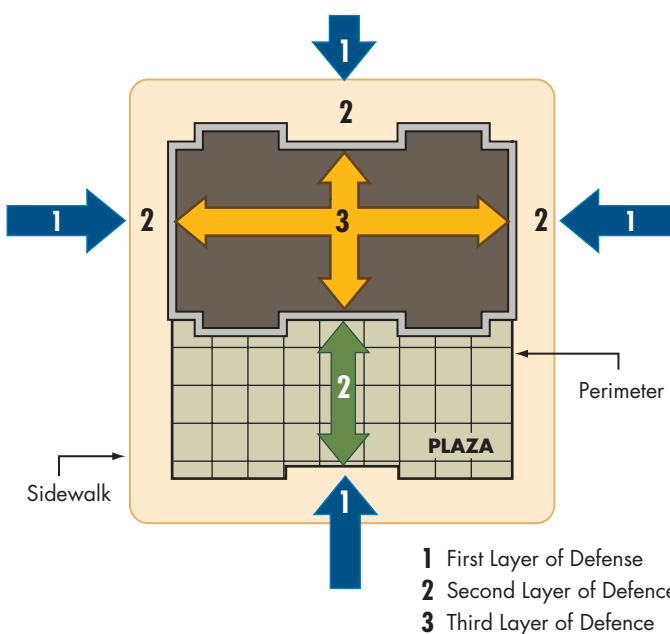

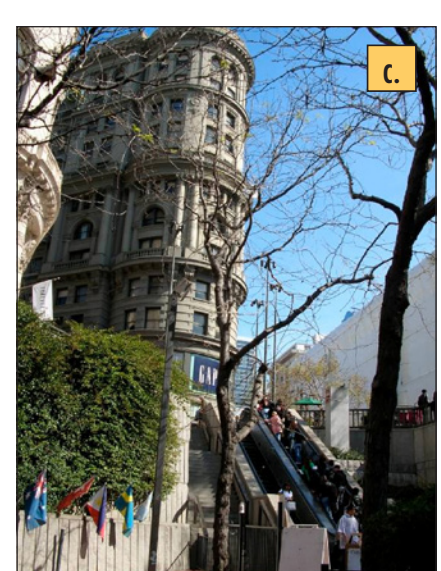

2. Threat Rating		
ID	Station Characteristics	Attribute Options
2.2	<p><b>Peak Number of Riders/Transfers per Day</b></p> <p>Number of people who embark and disembark at a transit station on a peak day. Most transit authorities provide ridership reports to the public via the Internet. The screener should research this characteristic during the pre-field assessment. When ridership information is not available, the screener will have to estimate the number of riders per day.</p> <p>To determine whether a threat is credible, the screener should talk to a senior security representative for the station or transit authority to obtain the most accurate information. Information may also be available from law enforcement officials in the area, newspapers, and Internet searches. The screener may have to use judgment based on the best available information at the time of the screening.</p>	<p><b>Low ridership (in riders per day):</b></p> <ul style="list-style-type: none"> <li>a. Less than 1,000</li> <li>b. 1,000 to 2,000</li> <li>c. 2,000 to 5,000</li> <li>d. 5,000 to 10,000</li> <li>e. 10,000 to 20,000</li> </ul> <p><b>High ridership (in riders per day):</b></p> <ul style="list-style-type: none"> <li>f. 20,000 to 50,000</li> <li>g. 50,000 to 100,000</li> <li>h. 100,000 to 150,000</li> <li>i. 150,000 to 200,000</li> <li>j. More than 200,000</li> </ul>
2.3	<p><b>Terrorist Threats (Credible)</b></p> <p>A terrorist threat refers to any planned, thwarted, or successful attack against the station or transit system in the past or present. This characteristic addresses the likelihood of a terrorist attack occurring at the station under consideration. Unsubstantiated threats, such as called-in bomb threats, should not be considered.</p> <p>To determine whether a threat is credible, obtain the most accurate information, the screener should talk to a senior security representative for the station or transit authority. Information may also be available from law enforcement officials in the area, newspapers, and Internet searches. The screener may have to use judgment based on the best available information at the time of the screening.</p>	
2.3.1	<p><b>Terrorist Threats: Station</b></p> <p>Any credible threat, past or present, to the station.</p>	<ul style="list-style-type: none"> <li>a. No</li> <li>b. Previous</li> <li>c. Current</li> </ul>
2.3.2	<p><b>Terrorist Threats: Transit System</b></p> <p>Any credible threat to the transit system operating the station. If a credible threat has been made to a transit system (e.g., Washington Metro), but no particular station has been identified, the threat should be counted.</p>	<ul style="list-style-type: none"> <li>a. No</li> <li>b. Previous</li> <li>c. Current</li> </ul>


2. Threat Rating		
ID	Station Characteristics	Attribute Options
2.4	<p><b>High-Value/CIKR Targets</b></p> <p>A high-value/CIKR target is any structure or asset the incapacitation or destruction of which would have a debilitating impact on the security, economy, public health or safety, and/or environment across any Federal, State, regional, territorial, or local jurisdiction.</p> <p>The 18 Critical Infrastructure and Key Resources (CIKR) sectors defined by DHS for evaluating target density are listed below and are available in the DCF and also in DHS (2009). Subsectors should also be reviewed for this characteristic (see Appendix E).</p> <p><b>CIKR Sectors</b></p> <ul style="list-style-type: none"> <li>• Agriculture and Food</li> <li>• Banking and Finance</li> <li>• Chemical</li> <li>• Commercial Facilities</li> <li>• Communications</li> <li>• Critical Manufacturing</li> <li>• Dams</li> <li>• Defense Industrial Base</li> <li>• Emergency Services</li> <li>• Energy</li> <li>• Government Facilities</li> <li>• Healthcare and Public Health</li> <li>• Information Technology</li> <li>• National Monuments and Icons</li> <li>• Nuclear Reactors, Materials and Waste</li> <li>• Postal and Shipping</li> <li>• Transportations Systems</li> <li>• Water</li> </ul>  <p><i>A subway station adjacent to an interstate highway, a CIKR</i></p>	<p>High-value/CIKR targets are divided into two zones for this characteristic according to the distance of the target from any point of the perimeter of the station. Zone 1 is within 300 feet of any point of the perimeter of the station, and Zone 2 is between 300 feet and 1,000 feet of any point of the perimeter of station. In most cities, 300 feet is equal to approximately 1 block, and 1,000 feet is equal to approximately 3 blocks.</p> <p><b>Zone 1.</b> Number of targets within 300 feet of any point of the perimeter of the station.</p> <ol style="list-style-type: none"> <li>None</li> <li>1 to 6</li> <li>7 to 12</li> <li>13 to 19</li> <li>20 or more</li> </ol> <p><b>Zone 2.</b> Number of targets between 300 feet and 1,000 feet of any point of the perimeter of station.</p> <ol style="list-style-type: none"> <li>None</li> <li>1 to 6</li> <li>7 to 12</li> <li>13 to 19</li> <li>20 or more</li> </ol>  <p><b>Zone 1</b> – Within 300 feet of the perimeter of the structure</p> <p><b>Zone 2</b> – Within 1,000 feet of the perimeter of the structure</p>

2. Threat Rating		
ID	Station Characteristics	Attribute Options
2.5	<p><b>Significance of Station</b></p> <p>Symbolic nature or landmark status of the station. If the station is on a national, State, local, or non-governmental historic registry, the screener should select Option C, National.</p> <p>The screener can determine whether the station is on an historic registry by:</p> <ul style="list-style-type: none"> <li>Consulting with the transit authority or building management</li> <li>Reviewing the National Register of Historic Places at <a href="http://www.nationalregisterofhistoricplaces.com">www.nationalregisterofhistoricplaces.com</a></li> <li>Checking with States, local jurisdictions, and non-governmental organizations for listings of historically significant buildings within a locality</li> <li>Checking the outside of the station or building in which the station is housed for a plaque indicating its status as an historic property.</li> </ul>  <p><i>a. Local station</i></p>  <p><i>b. Station with regional significance</i></p>	<p>a. <b>Local.</b> The transit station is recognizable only to locals and can be confused with other similar stations. The station has no media value or symbolism to the general public.</p> <p>b. <b>Regional.</b> The transit station is recognizable only to people around the State and region. The station is prominent in the local community and is a local landmark. The station has some media value on a regional level.</p> <p>c. <b>National.</b> The transit station is easily recognizable and is featured in the mass media on a national level. The station is considered a landmark and is located in an architecturally significant structure.</p> <p>d. <b>International.</b> The station is easily recognizable and is featured in the mass media internationally.</p>  <p><i>c. Station with national significance</i></p>

2. Threat Rating		
ID	Station Characteristics	Attribute Options
2.6	<p><b>Function Criticality within System/Region</b></p> <p>Function criticality describes the importance of a station to the regional transportation system. When a station is heavily used but has redundancy with other transit lines, it should be rated lower.</p>	<ul style="list-style-type: none"> <li>a. <b>Very low.</b> The regional transit system would barely be affected by loss of the station, and regional authorities would easily be able to route passengers around distressed areas.</li> <li>b. <b>Low.</b> Loss of the station would result in delays in the regional transit system, and passengers would have longer commutes, but regional transit mobility would not be severely affected.</li> <li>c. <b>Moderate.</b> Loss of the station would cause significant delays in the regional transit system, but movement around the region would continue.</li> <li>d. <b>High.</b> Loss of the station would severely strain the regional transit system, and movement around the region via other modes would be disrupted significantly.</li> <li>e. <b>Very high.</b> The regional transit system has no redundancy to compensate for the loss of the station; transit operations around the region would nearly cease (for example, when station is a regional or multi-modal transportation hub).</li> </ul>
2.7	<p><b>Number of Entrances/Exits</b></p> <p>An entrance is defined as a single point of entry from the street or any other means of access into a transit station. Emergency exits are not counted as regularly used entrances and exits, and transfer points between lines are not considered separate entrances. An entrance may be stairs, escalators, elevators, or people movers.</p>  <p><i>Two station entrances, an elevator (right) and a stairwell (left)</i></p>	<ul style="list-style-type: none"> <li>a. 1 to 2</li> <li>b. 3 to 4</li> <li>c. 5 to 8</li> <li>d. 9 to 12</li> <li>e. More than 12 or unlimited (open-air stations)</li> </ul>



2. Threat Rating		
ID	Station Characteristics	Attribute Options
2.8	<p><b>Plaza/Public Area</b></p> <p>A plaza is an open public space outside the controlled access to the station. The plaza may be at grade or below grade and may have public seating areas. If not properly designed, plazas may make the station susceptible to a vehicular collision or car bombing. An acceptable standoff distance can be created by incorporating a plaza in the site. Barriers and landscape features should be designed to make the plaza impenetrable by a vehicle. The size and vulnerability of the plaza should be reviewed using the descriptions of the attribute options.</p>  <p>1 First Layer of Defense 2 Second Layer of Defence 3 Third Layer of Defence</p>  <p><i>d. Public plaza with some protection</i></p>	<p>a. <b>Not applicable</b></p> <p>b. <b>None.</b> No plaza or area where public can congregate just outside the control area into the station.</p> <p>c. <b>Well-controlled.</b> Numerous barriers that are well-positioned to obstruct vehicular entry.</p> <p>d. <b>Moderate control.</b> Some vehicular barriers but several notable security flaws (e.g., temporary or ornamental barriers that can easily be defeated by vehicles).</p> <p>e. <b>Not controlled.</b> No vehicular barriers.</p>  <p><i>c. Below-grade public plaza leading to a transit entrance with numerous obstacles between traffic and the transit entrance</i></p>  <p><i>e. Public area adjacent to a subway station without limited access management controls</i></p>

2. Threat Rating		
ID	Station Characteristics	Attribute Options
2.9	<p><b>Protective Deterrence Measures</b></p> <p>Visibility and/or prominence of protective security measures that discourage an aggressor from attacking the transit station. Security creates a psychological deterrent for an aggressor who is considering attacking the station. Visibility inhibits criminal behavior because of the fear of being caught. A potential aggressor who perceives a risk of being caught may be deterred from attacking the station.</p> <p>For deterrence to be effective, security measures should be prominent and visible throughout the station (i.e., perimeter, site, and station interior). Combined security measures, such as those listed below, may be used in all areas of the station:</p> <ul style="list-style-type: none"> <li>• Security guards (armed and unarmed)</li> <li>• Law enforcement patrols</li> <li>• Monitoring and surveillance equipment</li> <li>• Dedicated search and screening</li> <li>• Random search and screening</li> <li>• Mobile screening (e.g., canine unit)</li> <li>• Access controls</li> <li>• Public awareness and notification of protective measures</li> </ul>	<p>a. <b>High.</b> Security measures are prominent and visible in all areas of the station, from the point a person enters the site to the platform of the station.</p> <p>b. <b>Medium.</b> Security measures are prominent and visible only in one or two areas of the station. For instances, security measures may be prominent at the platform of the station but not at the perimeter of the site or vice versa.</p> <p>c. <b>Low.</b> Security measures are minimal or not visible enough to discourage an attacker in any area of the station. An attacker would not be discouraged by the security measures from attacking the station.</p>
2.10	<p><b>Accessibility of Off-Duty Vehicles/Equipment</b></p> <p>Accessibility of off-duty vehicles (e.g., subway cars, trolleys), transit maintenance equipment or parts, and other transit related supplies that are stored by the station. Equipment that is stored in a transit station, even if abandoned or unrelated to transit operations, should be counted.</p>  <p><i>Transit equipment stored adjacent to a large transit transfer station</i></p>	<p>a. Not applicable</p> <p>b. No accessibility</p> <p>c. Low</p> <p>d. Moderate</p> <p>e. High</p>

2. Threat Rating		
ID	Station Characteristics	Attribute Options
2.11	<b>Flooding History</b>  Flood waters can disrupt signals underground and can require the electrified third rail be shut off. The screener should research historical data of flooding at the station through newspaper and Internet searches prior to the field assessment.	a. <b>Not applicable.</b> Not subjected to flooding due to elevated structure b. <b>None.</b> No record of flooding. c. <b>Limited.</b> Some flooding has occurred, but service was either not disrupted or quickly restored. d. <b>Moderate.</b> Flooding has occurred often, causing disruptions. e. <b>Severe.</b> Flooding has impaired operations for significant periods.

## 4.5 Step Three: Vulnerability Rating

### 4.5.1 Vulnerability Rating Characteristics

**T**he vulnerability rating is a function of station characteristics that may be adversely affected by a terrorist attack, natural hazard, or accidental event.

The vulnerability rating characteristics are:

- Site
- Architecture
- Structure
- Ventilation (including HVAC)
- Fire protection
- Operations (e.g., power supply, lighting)
- Nonstructural components
- Physical security
- Cyber infrastructure
- Operational security

#### 4.5.1.1 Site

Site vulnerability refers to the condition of the area surrounding and above the transit station, including exposure of the station, elevation, and water drainage.

### 4.5.1.2 Architecture

Architectural considerations involve station layout and space design. Space design relates to separating public areas of the station from the more secured areas of the facility. Features such as the number of entrances, number of levels, service entrances, lobby/lobbies, retail space, and integrated/adjacent parking garages are key characteristics of architectural vulnerabilities.

### 4.5.1.3 Structure

Structural vulnerability is defined as a weakness in a structure's ability to support its own weight and the weight of its contents and to resist loads from wind and earthquake. Structural vulnerabilities can be exploited by an aggressor. Evaluating structural vulnerabilities is limited by the extent to which the structure is covered with finishes. The structural framing in public areas is typically covered for aesthetic purposes, making it difficult to determine the materials underneath the finishing.

To identify the structural characteristics as accurately as possible, the following steps should be taken before the field assessment:

- Review the structural as-built drawings, including renovations/retrofits. Drawings provide the most detailed structural information.
- Make arrangements to talk to the transit station engineer during the field assessment.
- Request permission to tour areas without interior finishes or areas not accessible by the public.

Reviewing the drawings and questioning the transit station engineer may be the most efficient way to assess the structural vulnerability. Site observation can be more time-consuming but is necessary when the drawings are not available.

The structural characteristics that are evaluated have a strong influence on a transit station's performance in a terrorist attack or natural disaster. Structural vulnerability to an explosive event is dependent on the magnitude of the air blast shock wave as it loads walls, columns, and floor/framing.

### 4.5.1.4 Ventilation

Ventilation refers to any system that permits air intake or exhaust to control temperature or remove moisture, odors, smoke, heat, dust, and airborne bacteria. Ventilation systems are also referred to as heating, ventilating, and air conditioning (HVAC) systems. Ventilation systems are required in transit stations because of heat from the railway tunnels, fire



hazards, exhaust from vehicles, and the potential for CBR threats. All building structures that are served by the ventilation systems in the station are included in the IRVS.

Vulnerability is dependent on the exposure, protection, and redundancy of HVAC systems. The likelihood of a CBR contaminant being introduced in the transit station is greatly influenced by the accessibility of the air vents to the public.

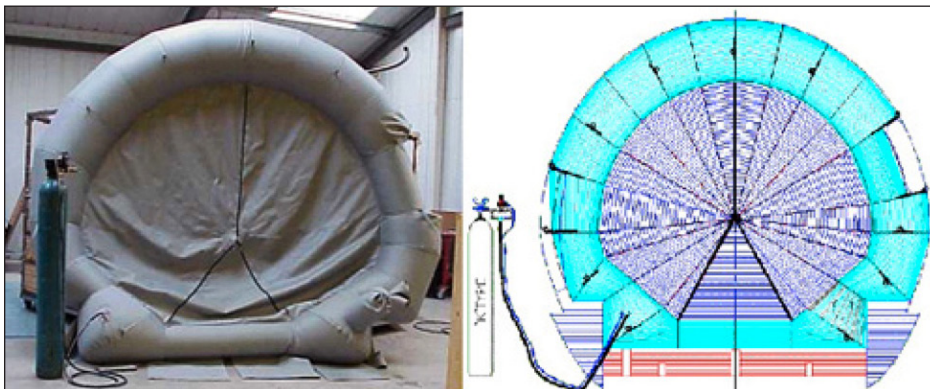
Ventilation system characteristics are given significant weight in the vulnerability rating for CBR threat scenarios.

#### 4.5.1.5 Fire Protection

A fire protection system in the transit station serves the functions of preventing, suppressing, and protecting against the hazards of a fire. Fire protection systems include fire and smoke-detection and alarm as well as fire suppression. Life safety in the transit station is supported by the fire protection system which initiates evacuation, allows for safe evacuation, and suppresses the fire prior to the arrival of fire fighters.

There are eight subsystems that need to operate in order to have a functional fire safety system in a transit station:

- |                     |                               |
|---------------------|-------------------------------|
| ■ Detection         | ■ Communications              |
| ■ Alarm             | ■ Response plan               |
| ■ Verification      | ■ Personnel evacuation        |
| ■ Incident location | ■ Smoke control (ventilation) |



**Figure 4-3:**  
The “Tunnel Plug” is an example of an innovative fire suppression system under development for tunnels. Funded by DHS S&T, the plug is designed to drop from the ceiling and inflate inside the tunnel, essentially sealing off the passageway and preventing smoke or fire from spreading.

#### 4.5.1.6 Operations

Operations refer to the critical utility and control functions required for the transit station to operate safely and efficiently (e.g., power supply, lighting, monitoring, surveillance).

#### 4.5.1.7 Nonstructural

Nonstructural vulnerabilities are vulnerabilities in non-load-bearing features (e.g., wall and ceiling finishes, fixture attachments, police booths, barriers).

#### 4.5.1.8 Physical Security

Physical security refers to any method or system whose purpose is to detect, prevent, and protect against any threat or hazard. The availability and effectiveness of security-related detection systems are the key concerns in physical security vulnerabilities.

The evaluation of the physical security vulnerability consists of two sections in the data collection form.

1. **Security System Checklist.** The vulnerability assessment of physical security begins by reviewing the available security systems in the station. The screener evaluates the available security systems by completing the checklist of general security systems that can be used to detect and/or interdict against a threats to the station.
2. **Security System Evaluation.** The second portion of the physical security evaluates the security measures in relation to the specific threats. For each threat scenario, the screener evaluates the number of systems (from the security system checklist) and the effectiveness of the collective systems to protect against the specific threat scenario. The purpose is to assess the ability of a given security system to prevent a threat from being carried out.

#### 4.5.1.9 Cyber Infrastructure

Cyber infrastructure includes electronic information, control systems, and/or communication systems needed for daily operations. Cyber infrastructure is critical to the functions and services of a transit station. Because cyber infrastructure is interconnected, attacks using cyber tools can spread quickly and have debilitating effects. Cyber vulnerabilities are addressed through the evaluation of communication and control systems of the transit station.

Security and information technology personnel should be interviewed during the field assessment. Review cyber-security system documentation is also recommended.


#### 4.5.1.10 Operational Security



Operational security refers to the transit agency's emergency preparedness and planning for the transit station. Operational security vulnerabilities are assessed by evaluating emergency and security response plans, mass evacuation plans, and training of emergency response personnel.

### 4.5.2 Catalog of Station Characteristics and Attribute Options for the Vulnerability Rating

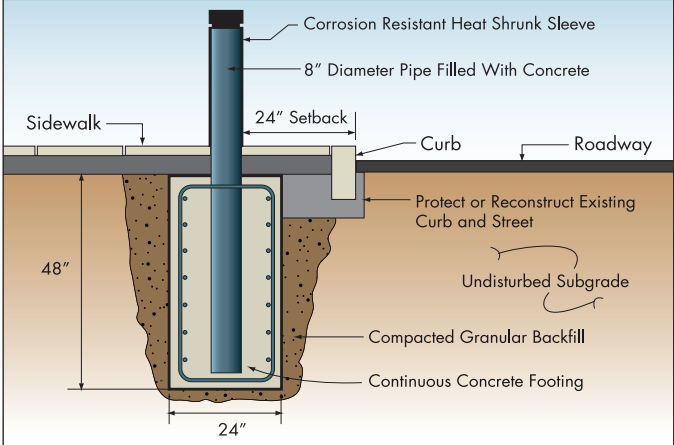
The catalog of vulnerability characteristics and attribute options is provided in Tables 4-3a through 4-3j. The catalog is also provided electronically in the IRVS database. The ID number in the catalog corresponds to the number of the characteristic in the DCF. The screener should use the catalog as a reference, as needed, when completing the DCF.

Table 4-3a: Catalog of Station Characteristics and Attribute Options for Site Vulnerabilities

3. Vulnerability Rating: Site Vulnerabilities		
ID	Station Characteristics	Attribute Options
3.1	<p><b>Presence of Stand Pipes/Fire Hydrants (Water Supply)</b></p> <p>A standpipe is a type of rigid water piping that is built into the station in a vertical position. Fire hoses can be connected to the piping, allowing manual application of water to the fire. Stations that are open environment or open air and at grade may only have fire hydrants. The presence of standpipes and/or fire hydrants in the station should be used to evaluate the adequacy of water supply to the station. The availability and sufficiency of water provided to the station is critical for general operations such as fire</p> 	<p>a. Yes</p> <p>b. No</p>



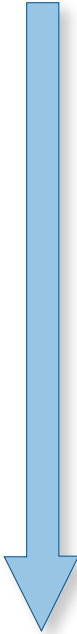


3. Vulnerability Rating: Site Vulnerabilities		
ID	Station Characteristics	Attribute Options
3.2	<p><b>Water Drainage</b></p> <p>Adequate water drainage allows the station to clear water in a timely manner during a water surge. Service on a rail or transit system may be disrupted by flooding of only a few inches. Rain-water can disrupt underground signals and require the electrified third rail to be shut off. Water drainage should be evaluated by inspection of the drainage structures, pump room (when present), and research of historical data of flooding in the station.</p> 	<ul style="list-style-type: none"> <li>a. <b>Excellent.</b> The station controls water inflow well and flooding does not impede transit operations.</li> <li>b. <b>Moderate.</b> Some flooding has occurred, but service was either not disrupted or quickly restored.</li> <li>c. <b>Limited.</b> Flooding has impaired operations for limited periods.</li> <li>d. <b>Deficient.</b> Flooding has impaired operations for significant periods</li> </ul> 
3.3	<p><b>Natural Protective Barriers</b></p> <p>Natural protective barriers are terrain elements such as grassy knolls, hills, ditches, boulders, shrubs, trees, or water bodies that make traversing a site difficult or may at least delay an aggressor. Assess the degree to which natural barriers shield the transit station from vehicles that can intentionally or accidentally damage the station.</p>	<ul style="list-style-type: none"> <li>a. <b>Not applicable</b></li> <li>b. <b>High.</b> Transit station is surrounded by natural features that would make a close approach by a vehicle nearly impossible. Station has incorporated Crime Protection Through Environmental Design principles.</li> <li>c. <b>Medium.</b> Station has natural features that create obstacles to approaching vehicles. Approaching the station by vehicle is difficult but not impossible.</li> <li>d. <b>Low.</b> Station has little or no protection from vehicular impact, either accidental or intentional.</li> </ul>
3.4	<p><b>Manmade Barriers</b></p> <p>Manmade barriers such as bollards, fencing, walls, floors, roofs, bars, and roadblocks are used to restrict, channel, or impede access and provide standoff distance between the station and vehicles. These barriers are designed to deter threats and delay the undeterred aggressor. Assess the degree to which manmade barriers shield the transit station from vehicles that can intentionally or accidentally damage the station.</p> <p>The screener evaluates this characteristic by assessing the presence and effectiveness of bollards/barriers and fencing at the site.</p>	

## 3. Vulnerability Rating: Site Vulnerabilities

ID	Station Characteristics	Attribute Options
3.4.1	<p><b>Barriers/Bollards</b></p> <p>Physical wall or bollard that provides an interface to prevent vehicles from passing, but allowing entrance of pedestrians and bicycles</p>  <p><i>Diagram of typical bollard installation (FEMA 430)</i></p>	<p>a. <b>Not applicable</b></p> <p>b. <b>High.</b> Permanent barrier resistance up to a 15,000-pound vehicle traveling at 50 mph with penetration of less than 3 feet. Vehicle entry to the station must be hardened to the same standard.</p> <p>c. <b>Medium.</b> Permanent barrier resistance up to a 15,000 pound vehicle traveling at 40 mph with penetration of less than 20 feet.</p> <p>d. <b>Low.</b> Fixed or movable barrier designed to limit or redirect vehicular access.</p>
3.4.2	<p><b>Fencing</b></p> <p>A common means of establishing a physical protective barrier to protect a controlled area.</p> <p><b>High Attribute Characteristics</b></p> <ul style="list-style-type: none"> <li>• Double buried fence line – two staggered fences</li> <li>• Height of 10 feet</li> <li>• Anti-climb/anti-cut fencing – vertical bars with horizontal supports designed to make climbing difficult</li> <li>• Top guard – an overhang of barbed wire or tape along the top of the fence, facing outward and upward at approximately a 45-degree angle</li> <li>• Hardened posts</li> <li>• Counter-sunk into concrete</li> </ul> <p><b>Medium Attribute Characteristics</b></p> <ul style="list-style-type: none"> <li>• Single buried fence line</li> <li>• Height of 10 feet</li> <li>• Hardened posts</li> <li>• Counter-sunk into concrete</li> </ul> <p><b>Low Attribute Characteristics</b></p> <ul style="list-style-type: none"> <li>• 7-foot chain-link fence</li> </ul>	<p>a. <b>Not applicable</b></p> <p>b. <b>High.</b> Designed to provide optimal restriction or delay to pedestrian-based attacks. Vehicle and pedestrian gates are designed to continue the structural integrity of the fence line.</p> <p>c. <b>Medium.</b> Designed to restrict or delay pedestrian-based attacks. Vehicle and pedestrian gates are designed to continue the structural integrity of the fence line.</p> <p>d. <b>Low.</b> Fence provides minimal delay to a pedestrian-based assault.</p>


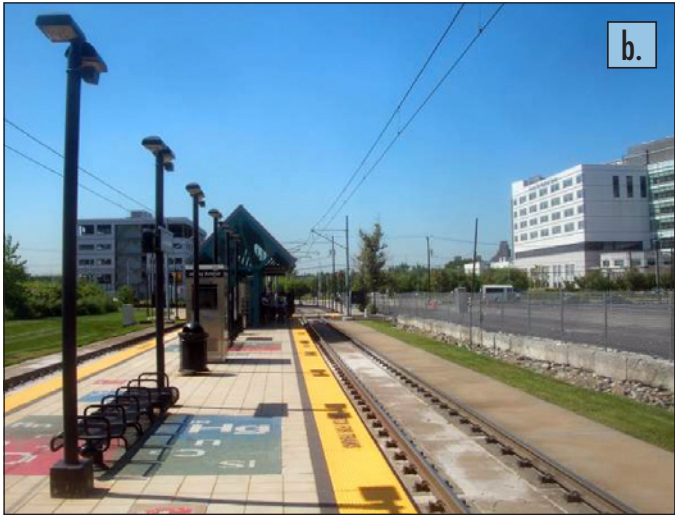



## 3. Vulnerability Rating: Site Vulnerabilities

ID	Station Characteristics	Attribute Options
3.5	<p><b>Station Elevation</b></p> <p>Elevation in relation to the prevailing street level or surrounding area.</p> <div data-bbox="256 464 927 1073">  <p>a.</p> </div> <p><i>a. An at-grade subway station</i></p> <div data-bbox="256 1150 927 1627">  <p>b.</p> </div> <p><i>b. An elevated subway station built on a steel structure over an active roadway</i></p>	<p><b>Least Risky</b></p> <div data-bbox="964 422 1040 1052">  </div> <ul style="list-style-type: none"> <li>a. <b>At grade.</b> At street level. Typically located outside central cities.</li> <li>b. <b>Above grade.</b> Above the prevailing grade or street level. Typically built on steel platforms, concrete viaducts, or masonry structures.</li> <li>c. <b>Below grade, above water table.</b> Below street level or prevailing natural features. Typically subway or open-air stations below the street level.</li> <li>d. <b>Above water.</b> Typically on bridges or viaducts.</li> <li>e. <b>Below grade, below water table</b></li> </ul> <p><b>Most Risky</b></p> <div data-bbox="954 1150 1385 1501">  <p>b.</p> </div> <div data-bbox="954 1549 1385 1816">  <p>c.</p> </div> <p><i>c. Entrance to a below-grade subway station</i></p>

3. Vulnerability Rating: Site Vulnerabilities		
ID	Station Characteristics	Attribute Options
	<p><b>Station Elevation Options</b></p>	
3.6	<p><b>Depth of Cut and Cover above Station</b></p> <p>The distance the station was constructed below grade, where it is at or below grade.</p>	<p>a. <b>Not applicable.</b> At or above grade.</p> <p>b. <b>Deep.</b> Multi-level station below grade or single-level station more than 30 feet below grade.</p> <p>c. <b>Shallow.</b> Single-level station 10 to 30 feet below grade.</p> <p>d. <b>Exposed.</b> Station 0 to 10 feet below grade with an open cut.</p>
3.7	<p><b>Concourse</b></p> <p>Location where numerous hallways, passageways, stairways, and elevators converge. It is an open space that accommodates large crowds and allows for efficient distribution of people between locations, typical in inter-modal terminals.</p> <p><i>Crowded concourse at rush hour</i></p>	<p>a. No</p> <p>b. Yes</p>



## 3. Vulnerability Rating: Site Vulnerabilities

ID	Station Characteristics	Attribute Options
3.8	<p><b>Adjacent Buildings</b></p> <p>Applicable to any inhabited commercial, residential, institutional, or industrial structure within 300 feet of a transit station. Buildings that used to support transit operations, such as maintenance facilities and or transit parking garages, are not counted.</p> <div data-bbox="256 617 927 1094">  </div> <p><i>a. No adjacent buildings.</i></p> <div data-bbox="256 1169 927 1682">  </div> <p><i>b. Some adjacent buildings</i></p> <div data-bbox="956 1071 1386 1682">  </div> <p><i>c. Numerous adjacent buildings</i></p>	<p>a. <b>None.</b> No adjacent buildings. Typical of this category are suburban locations with large commuter parking facilities and rural locations.</p> <p>b. <b>Some.</b> Some adjacent buildings. Typical of this category are urban and suburban neighborhoods with one- and two-story structures nearby.</p> <p>c. <b>Numerous.</b> Numerous adjacent buildings. Typical of this category are stations in dense urban neighborhoods, such as central cities or dense urban settings.</p>


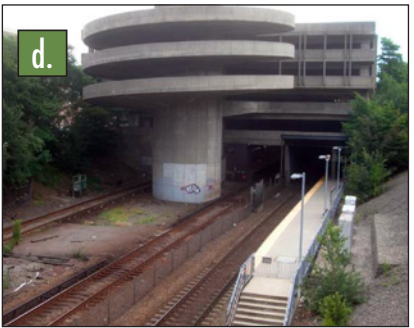




3. Vulnerability Rating: Site Vulnerabilities																
ID	Station Characteristics	Attribute Options														
3.9	<p><b>Geology (Soil Condition)</b></p> <p>Geology, or soil condition, describes the type of soil/Geology, or soil condition, describes the type of soil/rock that a transit station is built on or under. The geology surrounding the station is critical to the framing and structure because it provides a substantial percentage of the load carrying capacity for underground structures. If the type of soil is not easy to identify, the screener should ask the transit authority.</p> <table border="1"> <thead> <tr> <th>Soil Type</th> <th>Suitability</th> </tr> </thead> <tbody> <tr> <td>Hard Rock</td> <td>Best</td> </tr> <tr> <td>Sand and Gravel</td> <td>Medium</td> </tr> <tr> <td>Medium and Hard Clays</td> <td>Medium</td> </tr> <tr> <td>Silts and Soft Clays</td> <td>Poor</td> </tr> <tr> <td>Organic Silt and Clays</td> <td>Poor</td> </tr> <tr> <td>Peat</td> <td>Poor</td> </tr> </tbody> </table>	Soil Type	Suitability	Hard Rock	Best	Sand and Gravel	Medium	Medium and Hard Clays	Medium	Silts and Soft Clays	Poor	Organic Silt and Clays	Poor	Peat	Poor	<p>a. Hard rock b. Medium c. Poor</p> <p>Note the following danger flags in the DCF by checking the red flag and adding comments.</p> <ul style="list-style-type: none"> <li>• High water table</li> <li>• Presence of soft soils</li> <li>• Cut and fill</li> <li>• Evidence of slides or subsidence</li> </ul>
Soil Type	Suitability															
Hard Rock	Best															
Sand and Gravel	Medium															
Medium and Hard Clays	Medium															
Silts and Soft Clays	Poor															
Organic Silt and Clays	Poor															
Peat	Poor															
3.10	<p><b>Accessibility of Off-Duty Vehicles/Equipment</b></p> <p>Accessibility of off-duty vehicles (e.g., subway cars, trolleys), transit maintenance equipment or parts, and other transit related supplies that are stored by the station. Equipment that is stored in a transit station, even if abandoned or unrelated to transit operations, should be counted.</p>	<p>a. Not applicable b. No accessibility c. Low accessibility d. Moderate accessibility e. High accessibility</p>														
3.11	<p><b>Hazardous Materials Storage</b></p> <p>Storage of hazardous materials in the station or in surrounding area pose a high risk to staff and riders because of the potential for combustion or release of lethal materials.</p> <p>Abundant open-source information on hazardous materials storage is available on Web sites such as the EPA, state office of emergency management, and local fire department.</p>	<p>a. No b. Yes</p>														

Table 4-3b: Catalog of Station Characteristics and Attribute Options for Architectural Vulnerabilities



4. Vulnerability Rating: Architectural Vulnerabilities		
ID	Station Characteristics	Attribute Options
4.1	<p><b>Number of Entrances/Exits</b></p> <p>An entrance is defined as a single point of entry from the street or any other means of access into a transit station. Emergency exits are not counted as regularly used entrances and exits, and transfer points between lines are not considered separate entrances. An entrance may be stairs, escalators, elevators, or people movers.</p>  <p><i>Two distinct station entrances, an elevator (left) and a stairwell (right)</i></p>	<ul style="list-style-type: none"> <li>a. 1</li> <li>b. 2 to 4</li> <li>c. 5 or More</li> </ul>
4.2	<p><b>Retail Spaces</b></p> <p>Retail space creates areas in the station that are open and inviting, but the presence of retail may introduce risks to the station and its occupants. Retail spaces are considered high-risk areas where an explosive (or CBR) device could be placed undetected. The location of retail spaces in relation to occupied/critical areas or primary structural framing affects the vulnerability of the building to an explosive attack.</p> 	<ul style="list-style-type: none"> <li>a. <b>None.</b> No retail spaces in the transit station.</li> <li>b. <b>Low.</b> A few small retail spaces such as kiosks and venders.</li> <li>c. <b>Medium.</b> More than one retail store in the transit station.</li> <li>d. <b>High.</b> Significant number of retail spaces but they do not attract non-transit riders.</li> <li>e. <b>Very High.</b> Significant amount of retail space in the station that attract both riders and non-riders.</li> </ul>



## 4. Vulnerability Rating: Architectural Vulnerabilities

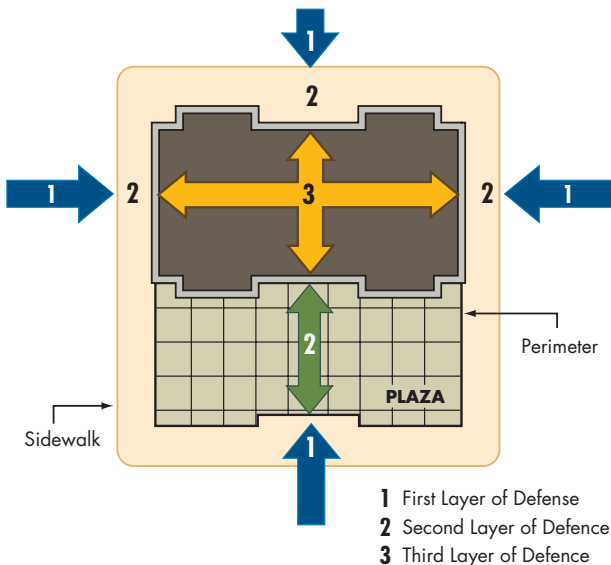

ID	Station Characteristics	Attribute Options
4.3	<p><b>Integrated/Adjacent Parking</b></p> <p>Parking spaces near the transit station increase the risks to the station. A parking garage is a particularly high-risk area where a vehicle, unscreened or screened, could deliver a weapon.</p> <p>The screener should question a site representative or walk around the exterior of the station to ascertain the location of parking lots or garages and select the attribute option that most closely represents the parking location relative to the station building and proximity to occupied/critical areas. Many stations, particularly in dense urban environments, are adjacent to garages in other structures and may connect through above or underground walkways.</p> <p>Some transit stations have “kiss-and-ride” or passenger drop off/pick up waiting areas near the station. These areas are not considered parking in the IRVS. Vulnerability from vehicles using these areas should be assessed in ID 3.4, Manmade Barriers.</p>  <p><i>b. Parking garage at a commercial facility adjacent to a transit station</i></p>	<p>a. <b>None.</b> No parking adjacent to the station.</p> <p>b. <b>Adjacent parking (not transit agency controlled).</b> Parking areas (public or restricted) not controlled by the transit agency and within 300 feet of the transit station.</p> <p>c. <b>Staff-only parking.</b> Adjacent parking area(s) restricted to transit staff for general parking or maintenance vehicles.</p> <p>d. <b>Public parking (transit agency controlled).</b> Public parking areas controlled by the transit agency.</p>  <p><i>c. A staff parking lock adjacent to a transit station</i></p>  <p><i>d. Public parking garage above a transit station.</i></p>

4. Vulnerability Rating: Architectural Vulnerabilities		
ID	Station Characteristics	Attribute Options
4.4	<p><b>Lobbies (Number &amp; Size)</b></p> <p>Transit station lobbies are typically areas where station attendants and ticket machines are located and fare collection occurs. Some lobbies have newspaper and/or food vendors.</p> <ul style="list-style-type: none"> <li>• <b>Small</b> – Simple, one-level or at-grade stations with one set of platforms</li> <li>• <b>Medium</b> – 1 or 2 two-level underground stations or elevated</li> <li>• <b>Large</b> – Multi-level stations underground with multiple lines and platforms</li> </ul>  <p><i>Small transit station lobby with fare controls (right) and attendant booth (left).</i></p>	<ul style="list-style-type: none"> <li>a. None</li> <li>b. 1 small</li> <li>c. 1 medium</li> <li>d. 1 large</li> <li>e. 2 small</li> <li>a. 2 medium</li> <li>b. 2 large</li> <li>c. 3+ small</li> <li>d. 3+ medium</li> <li>e. 3+ large</li> </ul>  <p><i>Large subway station lobby</i></p>
4.5	<p><b>Number of Observable or Concealed/Not Observable Occupied Spaces</b></p> <p>The station may have occupied spaces that are concealed or not observable and are considered high-risk areas where an explosive or CBR device could be placed undetected. The number of these spaces in relation to critical areas or primary structural framing affects the vulnerability of the station to explosive attack.</p> <p>These spaces are typically not considered lobbies where the public is expected and may be observed to pass through. However, when a station has a lobby or lobbies that are not observable, these spaces should be counted.</p>	<ul style="list-style-type: none"> <li>a. <b>None.</b> No observable or concealed/not observable occupied spaces.</li> <li>b. <b>No (1 to 2).</b> 1 to 2 occupied spaces (or lobbies) that are observable.</li> <li>c. <b>No (3+).</b> More than 3 occupied spaces (or lobbies) that are observable.</li> <li>d. <b>Yes (1 to 2).</b> 1 to 2 occupied spaces (or lobbies) that are concealed/not observable.</li> <li>e. <b>Yes (3+).</b> More than 3 occupied spaces (or lobbies) that are concealed/not observable.</li> </ul>



4. Vulnerability Rating: Architectural Vulnerabilities		
ID	Station Characteristics	Attribute Options
4.6	<p><b>Services Entrance</b></p> <p>Any entrance used by the transit organization's personnel that is not open to the general public and not used for emergency evacuation.</p> 	<p>a. <b>Not applicable</b></p> <p>b. <b>No.</b> No service entrance</p> <p>c. <b>Yes.</b> One or more service entrance(s)</p>
4.7	<p><b>Crowding/Congestion</b></p> <p>Refers to any potential for pedestrian tie-ups within the station during peak hours. Review the number of exits and type of exits available to people in the station.</p>  <p><i>Congested stairwell.</i></p>	<p>a. Multiple exit types</p> <p>b. Escalators only</p> <p>c. Stairs only</p> <p>d. Elevators only</p>

4. Vulnerability Rating: Architectural Vulnerabilities		
ID	Station Characteristics	Attribute Options
4.8	<p><b>Emergency Exits</b></p> <p>Emergency exits are egresses that facilitate the evacuation of riders and emergency personnel operations during an incident. Emergency exits should be clearly designated with the proper signage. The screener should count the number of independent (separate from public exits) emergency exits in the station.</p> 	<p>a. More than 4</p> <p>b. 3 to 4</p> <p>c. 2</p> <p>d. 1</p> <p>e. None</p>
4.9	<p><b>Number of Station Levels</b></p> <p>Number of levels open to the public, including platforms, lobbies, concourses/mezzanines, fare control areas, transfer passageways, service, and other areas in the station. For below-grade stations, the street level should not be considered unless the station has features that make it an attractive target at this level.</p>  <p><i>Ramps leading to two levels in a multi-level subway station</i></p>	<p>a. 1</p> <p>b. 2 to 3</p> <p>c. More than 3</p>

4. Vulnerability Rating: Architectural Vulnerabilities		
ID	Station Characteristics	Attribute Options
4.10	Ease of Egress from Vehicle/Trains to Station	a. Difficult b. Moderate c. Easy
4.11	<p><b>Plaza/Public Areas</b></p> <p>A plaza describes an open public space outside the controlled access to the station. The plaza may be at grade or below grade and may have a public seating area. If not properly designed, plazas may leave the station susceptible to a vehicular collision or car bombing. An acceptable standoff distance can be created by incorporating a plaza in the site. Barriers and landscape features should be designed to make the plaza impenetrable by a vehicle. The screener should review the size and vulnerability of the plaza using the descriptions of the attribute options.</p>  <p>1 First Layer of Defence            2 Second Layer of Defence            3 Third Layer of Defence</p>  <p><i>d. Public plaza with some protection.</i></p>	a. <b>Not applicable</b> b. <b>None.</b> No plaza or area where public may congregate just outside the control area into the station c. <b>Well controlled.</b> Public plaza has numerous barriers that are well-positioned to obstruct vehicular entry d. <b>Moderate control.</b> The plaza has some vehicular barriers, but has several notable security flaws (i.e., temporary or ornamental barriers that can easily be defeated by vehicles) e. <b>Not controlled.</b> Public plaza has no vehicular barriers

*c. Below-grade public plaza leading to a transit entrance with numerous obstacles between traffic and the transit entrance*






*e. Public area adjacent to a subway station without limited-access management controls*



Table 4-3c: Catalog of Station Characteristics and Attribute Options for Structural Vulnerabilities

5. Vulnerability Rating: Structural Vulnerabilities		
ID	Station Characteristics	Attribute Options
5.1	<b>Liner Relative Thickness</b>  The liner (or roof/wall) relative thickness refers to the thickness of the structural roof, wall, or envelope outlining the transit station. A transit station that has a thin liner that spans a long distance tends to be more vulnerable than one with a thicker liner and shorter span. In general, the relative liner thickness can be found in structural drawings of the transit station. Such information is difficult to ascertain visually, especially by the nonprofessional screener. For an approximate evaluation of this characteristic, the construction material of the liner can provide some clues to the relative liner thickness. The table below provides general guidelines for the relationships between construction materials and relative liner thickness.	<ul style="list-style-type: none"><li>a. Not applicable. Station is above grade</li><li>b. Thick</li><li>c. Medium</li><li>d. Thin</li><li>e. Very thin</li></ul>

## 5. Vulnerability Rating: Structural Vulnerabilities

ID	Station Characteristics	Attribute Options
5.2	<p><b>Construction Material</b></p> <p>Primary material used to construct the transit station's structural framework and envelope.</p> <div data-bbox="319 462 987 963">  <p><b>b.</b></p> </div> <p><i>b. Elevated subway station built primarily with steel</i></p> <div data-bbox="319 1039 987 1541">  <p><b>b.</b></p> </div> <p><i>b. Station primarily built with concrete</i></p>	<ul style="list-style-type: none"> <li>a. High-strength concrete/steel</li> <li>b. Steel, concrete and/or pre-stressed concrete</li> <li>c. Wrought iron</li> <li>d. Non-reinforced concrete</li> <li>e. Masonry or brick</li> </ul> <div data-bbox="1032 655 1442 970">  <p><b>a.</b></p> </div> <p><i>a. High-strength concrete and steel</i></p> <div data-bbox="1032 1047 1442 1369">  <p><b>c.</b></p> </div> <p><i>c. Example of wrought iron</i></p> <div data-bbox="1032 1444 1442 1768">  <p><b>e.</b></p> </div> <p><i>e. Example of brick used in the station's structure (a) High-strength concrete/steel</i></p>

## 5. Vulnerability Rating: Structural Vulnerabilities

ID	Station Characteristics	Attribute Options
5.3	<b>Known Retrofits</b> Recent structural upgrades to the station, including any addition of new technology or features to the existing system to increase the strength, durability, and/or service life of the structure. The screener should not give credit for simple "patch and repair" work to improve the aesthetics of the station.	a. Yes b. No
5.4	<b>Longest Span</b> Greatest distance between columns or other supporting structures.	a. Not applicable b. Less than 25 feet c. 25 to 40 feet d. 40 to 50 feet e. 50 feet or more
5.5	<b>Controlling Height</b> Average distance from floor to roof/ceiling.	a. Not applicable b. Less than 25 feet c. 25 to 40 feet d. 40 to 50 feet e. 50 feet or more
5.6	<b>Type of Framing</b> Type of structural frame or "skeleton" to which the interior and exterior envelopes of the station are attached.	a. Shell b. Plate c. Frame

**Shell**  
The station or platform surfaces are curved with no visible supporting columns

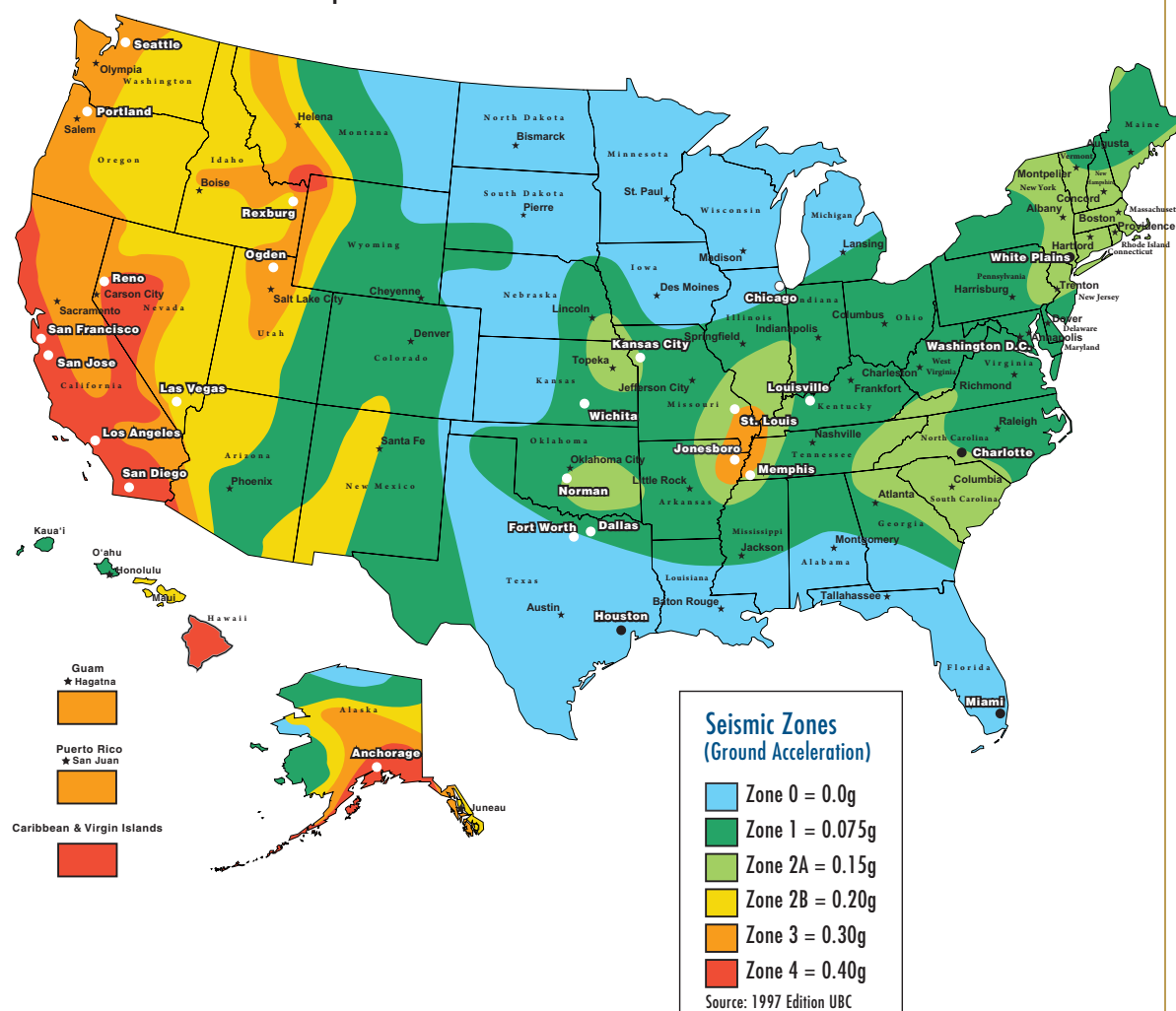
**Plate**  
The station or platform surfaces are planar (not curved) with no visible supporting columns

**Frame**  
Supporting columns are visible in the station or platform

## 5. Vulnerability Rating: Structural Vulnerabilities

ID	Station Characteristics	Attribute Options
5.7	<p><b>Seismic Design</b></p> <p>Stations in active fault/earthquake zones that were built with or retrofitted with seismic design to be resistant to earthquakes.</p>	<p>a. <b>Not applicable.</b> Not in a high seismic zone and does not require seismic design</p> <p>b. <b>Yes.</b> In an seismic zone and incorporates seismic design</p> <p>c. <b>No.</b> In an seismic zone and does not incorporate seismic design elements</p>

United States Seismic Zones Map





## 5. Vulnerability Rating: Structural Vulnerabilities










ID	Station Characteristics	Attribute Options
5.8	<p><b>Overall Structural Condition</b></p> <p>State of station maintenance, basic upkeep, and relative deterioration of important structural elements. Indicators of poor structural condition include aging members, discoloration, cracks, deflection, excessive vibrations, spalled or delaminated concrete, and corrosion. New materials, retrofitting, and lack of visual flaws may be taken as a sign of healthy structural condition</p>  <p><b>a.</b></p> <p><i>a. Recently retrofitted subway station</i></p>  <p><b>c.</b></p> <p><i>c. Discoloration and rust of station wall portray a few structural flaws, but the structural conditions will not hinder operations</i></p>  <p><b>e.</b></p> <p><i>e. Conditions have lessened the structural capacity of the column so that it requires bracing and can no longer carry the designed load</i></p>	<p>a. <b>Excellent.</b> Recently built or retrofitted.</p> <p>b. <b>Good.</b> Well maintained with few structural flaws.</p> <p>c. <b>Average.</b> A few major structural flaws, but none will impede safe transit operations or pedestrian movement.</p> <p>d. <b>Below average.</b> Major flaws in critical structural components that have the potential, without proper maintenance/repair, of impeding transit operations or pedestrian movement.</p> <p>e. <b>Poor.</b> Nearly unusable from lack of maintenance or other problems that have caused structural deterioration.</p>  <p><b>b.</b></p> <p><i>b. Station is well-maintained with few structural flaws</i></p>  <p><b>d.</b></p> <p><i>d. Severe corrosion of this steel beam and bearing in the station demonstrates a major flaw that could cause problems</i></p>

Table 4-3d: Catalog of Station Characteristics and Attribute Options for Ventilation Vulnerabilities

6. Vulnerability Rating: Ventilation Vulnerabilities		
ID	Station Characteristics	Attribute Options
6.1	<p><b>Protection of Ventilation Shafts</b></p> <p>Degree of protection and security features of the station's ventilation shafts. Ventilation shafts are typically small openings in the ground that permit air intake or exhaust and rarely have significant above-ground structural components (for larger structures, see ID 6.2, Protection of Ventilation Structures).</p>  <p><i>c. A vent shaft is raised above the street level with bars that provide extra protection, but vent still has some exposure</i></p>	<p>a. <b>Not applicable</b></p> <p>b. <b>Well-protected.</b> Vent is well shielded or is not visible to passers-by</p> <p>c. <b>Somewhat protected.</b> Vent has limited protection but is still vulnerable.</p> <p>d. <b>Not protected.</b> Vent is completely exposed; no attempt has been made to shield the vent from any hazard</p>  <p><i>d. Vent is exposed on a pedestrian sidewalk</i></p>

## 6. Vulnerability Rating: Ventilation Vulnerabilities

ID	Station Characteristics	Attribute Options
6.2	<p><b>Protection of Ventilation Structures</b></p> <p>The degree to which major vent structures are shielded from a planned terrorist attack, car accident, or the effects of a natural disaster.</p>  <p><i>d. A ventilation building exposed to a potential vehicular accident, explosion, or CBR attack, with little standoff distance from the nearby street</i></p>	<ul style="list-style-type: none"> <li>a. <b>Not applicable</b></li> <li>b. <b>Well-protected.</b> Protected from failure in the event of an attack, accident, or natural disaster</li> <li>c. <b>Somewhat protected.</b> Has features, either manmade or natural, so that it is shielded but not completely protected from an attack, accident, or natural disaster</li> <li>d. <b>Not protected.</b> No standoff distance from vehicles or exposed to natural hazards or another structural feature could cause ventilation functions to be compromised</li> </ul>
6.3	<p><b>Redundancy of Ventilation Systems</b></p> <p>Reliability of the ventilation system if one or more components of the station's system fail. Redundant ventilation systems provide an alternative or fail-safe by allowing connection to a backup system.</p>	<ul style="list-style-type: none"> <li>a) Not applicable</li> <li>b. Yes</li> <li>c. No</li> </ul>
6.4	<p><b>Ventilation Hardware Exposure</b></p> <p>Reflects the degree to which ventilation systems are visible and accessible to the general public.</p>  <p><i>b. Hardened enclosure</i></p>	<ul style="list-style-type: none"> <li>a. <b>Not applicable</b></li> <li>b. <b>Hardened enclosure.</b> HVAC system is behind secured doors and vents where it is neither visible nor accessible to the general public.</li> <li>c. <b>Covered, not hardened.</b> HVAC system is not visible to the general public but is accessible through unsecured doors, vents, or other access points.</li> <li>d. <b>Visible.</b> HVAC system is exposed and unprotected.</li> </ul>





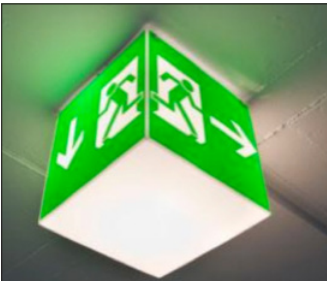

6. Vulnerability Rating: Ventilation Vulnerabilities		
ID	Station Characteristics	Attribute Options
6.4	<b>Ventilation Hardware Exposure (continued)</b>  <i>c. Covered, not hardened</i>	 <i>d. Visible</i>

Table 4-3e: Catalog of Station Characteristics and Attribute Options for Fire Protection System Vulnerabilities

7. Vulnerability Rating: Fire Systems Vulnerabilities		
ID	Station Characteristics	Attribute Options
7.1	<b>Code Inspection</b> Inspection by code enforcement officials within the last 12 months.	a. Yes b. No
7.2	<b>Backup Power System</b> Whether the station has a backup power system. A backup power system creates redundancy in the system, providing power to essential areas of the station in a power outage or interruption in the primary power supply.	a. Yes b. No
7.3	<b>Emergency Lighting System</b> Whether the station has an emergency lighting system. An emergency lighting system illuminates the station in a fire or other emergency or if the normal lighting system ceases to function. An emergency lighting system includes having a clearly lit evacuation path and emergency exit signage. 	a. Yes b. No

7. Vulnerability Rating: Fire Systems Vulnerabilities		
ID	Station Characteristics	Attribute Options
7.4	<b>Fire Control Systems</b>	
7.4.1	<b>Automatic Detection System</b>  Whether the station has a fire automatic detection system.  An automatic fire detection system is designed to detect the unwanted presence of fire by monitoring environmental changes associated with combustion. Automatic fire alarm systems can be used to notify people to evacuate in a fire or other emergency, to summon emergency services, and to prepare the station to control the spread of fire and smoke.	a. Yes  b. No
7.4.2	<b>Fire Control Panel</b>  Whether the fire control panel is in a publicly accessible location.  The fire control panel is an electric panel that controls the fire protection systems. It receives information from the detection system and automatically controls equipment to respond to a fire. The panel should be accessible in an easily identified location, typically near the main lobby on in a clearly marked fire control room.	a. Yes  b. No
7.4.3	<b>Automatic Detection System Reporting</b>  Who the automatic detection system reports to.  When the automatic detection system senses a fire based on certain changes in the environment of the station, it alerts people to the danger through fire alarms. The detection system may also transmit this information to emergency services outside the station.	a. Not applicable  b. Fire department  c. Offsite control center  d. Station control panel  e. No one – local alarm only
7.4.4	<b>Activation System</b>  When the automatic detection system is activated, certain other systems in the station may be triggered to facilitate safe evacuation. Security control devices such as ticket control barriers and emergency exit doors may be released, and elevators may be recalled to a designated floor. When the elevator is recalled, it proceeds to the recall floor and stops with its doors open. The elevator will not respond to calls or move in any direction. A fire service key switch is located on the fire recall floors. The fire service key switch has the ability to turn fire service off, turn fire service on, or bypass fire service. Only designated personnel should be able to control these emergency service switches.	a. Not applicable  b. Release security control devices and recall elevators  c. None

7. Vulnerability Rating: Fire Systems Vulnerabilities		
ID	Station Characteristics	Attribute Options
7.5	<b>Smoke Dampers in Ventilation System</b> Whether the ventilation system has smoke dampers.  Smoke dampers are passive fire protection devices used in air conditioning and ventilation ductwork to prevent the spread of smoke inside the ductwork where the ductwork penetrates fire-resistance rated walls and floors. Smoke dampers are installed inside the ducting by sheet metal contractors.	a. Yes b. No
7.6	<b>Sprinkler Systems</b>	
7.6.1	<b>Automatic Sprinkler System</b> Whether the station has an automatic sprinkler system.  An automatic fire sprinkler is an active fire protection measure, consisting of a water supply system, and provides adequate pressure and flow rate to a water distribution piping system onto which fire sprinklers are connected. Fire sprinkler systems should be installed in all transit stations.	a. Yes b. No
		
7.6.2	<b>Coverage of Automatic Sprinkler System</b> A typical sprinkler system operates when heat at the site of The presence of sprinklers in all areas of the station.  A typical sprinkler system operates when heat at the site of a fire causes a glass component in the sprinkler head to fail, thereby releasing the water from the sprinkler head. Sprinkler systems help to reduce the growth of a fire, thereby increasing life safety and limiting damage.	a. Not applicable b. Entire station c. Partial coverage

7. Vulnerability Rating: Fire Systems Vulnerabilities		
ID	Station Characteristics	Attribute Options
7.6.3	<p><b>Alternate Automatic Extinguishing System</b></p> <p>There are several alternatives to standard water sprinkler systems. These systems are common in places that cannot afford significant down time or loss of property as the result of a fire. The chemicals used in some alternate systems may be harmful to building occupants when released.</p>	<p>a. <b>Combination.</b> Consists of sprinkler heads and standpipe hose outlets attached to a common riser. Combination systems are either "wet" or "dry."</p> <p>b. <b>Clean agent/water mist.</b> A water mist system forces water and pressurized gas together to deliver a spray of small droplets. In a clean agent system, chemical agents are used to extinguish a fire. They are applied in either a total flooding or local application method. In total flooding, a three-dimensional area is filled with the agent in a concentration sufficient to stop fire. In local application the agent is applied only at the site of the fire.</p> <p>c. <b>Dry chemical.</b> In a dry chemical system, a powder-based agent extinguishes the fire by preventing the reaction causing the fire.</p> <p>d. <b>None</b></p>
7.7	<p><b>Station Knox Box</b></p> <p>Whether the station has a knox box.</p> <p>A knox box is a small, wall-mounted safe that holds all station keys for firefighters and Emergency Medical Technicians to retrieve in emergencies. Knox boxes simplify entry for fire departments and minimize property losses because firefighters do not need to break doors to gain entry. The location of the knox box is typically coordinated with the fire department.</p>	<p>a. Yes</p> <p>b. No</p>






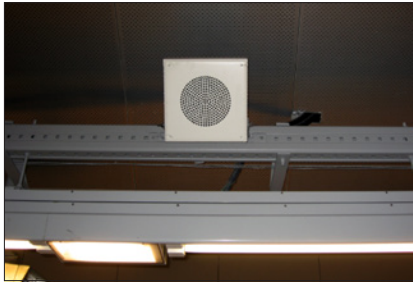
7. Vulnerability Rating: Fire Systems Vulnerabilities		
ID	Station Characteristics	Attribute Options
7.8	<p><b>Fare Collection System</b></p> <p>Method through which riders pay for each ride. The three system types are open access, automated, and restricted turnstiles. The fare collection system plays an important role in the ease with which a station can be evacuated.</p> 	<p>a. <b>Open access.</b> No turn styles or gates through which passengers must pass through to enter the transit car. Stations with this type of fare collection are easily evacuated in the event of an emergency.</p> <p>b. <b>Automated.</b> Riders swipe or touch their fare cards, which opens a gate to allow them into or out of the station. Gates are opened in the event of an emergency to allow riders to exit freely without swiping a card. Examples of this fare collection method are in the Metro system in Washington, D.C., and Boston subway systems.</p> <p>c. <b>Restricted turn style.</b> Riders swipe their cards and push through a turn style to enter and exit the station. This fare collection method results in a much slower evacuation of the station. Turn styles cannot be held open, so each rider must exit individually through the turn styles or through exit doors, neither of which is able to handle large volumes of people.</p>

Table 4-3f: Catalog of Station Characteristics and Attribute Options for Operations Vulnerabilities

8. Vulnerability Rating: Operations Vulnerabilities		
ID	Station Characteristics	Attribute Options
8.1	<p><b>Power Supply and Distribution: Enclosures</b></p> <p>Enclosures of power supplies include any covering of electrical equipment, generators, and other supporting infrastructure necessary for facility operations.</p> <div data-bbox="264 569 933 1094"> <p>a.</p>  </div> <p>a. Secure entrance to a power supply area with a hardened door and electronic key pad entry</p> <div data-bbox="264 1199 933 1717"> <p>c.</p>  </div> <p>c. Power supply system, with only a chain link fence for protection, exposed to the public and subject to tampering</p>	<p>a. <b>Well protected.</b> Power supplies are behind hardened enclosures with secure access points.</p> <p>b. <b>Marginally protected.</b> Power supply systems are concealed but not sufficiently hardened to withstand intentional tampering or a natural disaster.</p> <p>c. <b>Not protected.</b> Power supplies are exposed and easily accessible to the general public.</p> <div data-bbox="976 909 1409 1509"> <p>b.</p>  </div> <p>b. Power supply system behind a non-hardened door with a traditional lock and key entry system</p>





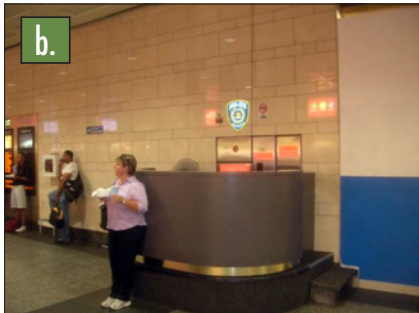
8. Vulnerability Rating: Operations Vulnerabilities		
ID	Station Characteristics	Attribute Options
8.2	Surveillance and Control	
8.2.1	<p><b>Coverage of Control Systems</b></p> <p>The number of surveillance, intrusion detection, and access management/control systems in operation describes the total number of security systems in place that are designed to allow facility personnel to monitor public behavior. Security systems can be simple or as complex as a comprehensive integrated intrusion detection system that includes a closed circuit television (CCTV) network.</p> <p>Two security systems, a CCTV camera and a mirror, are each different types of surveillance systems with differing qualities and deterrence values.</p>  <p><i>Two security systems, a CCTV camera and a mirror, are each different types of surveillance systems with differing qualities and deterrence values</i></p>	<p>a. <b>Open access.</b> No turnstiles or gates through which passengers must pass to enter the transit car. Stations with this fare collection system are easily evacuated in the event of an emergency.</p> <p>b. <b>Automated.</b> Riders swipe or touch their fare cards, which opens a gate to allow them into or out of the station. Gates are opened in the event of an emergency to allow riders to exit freely without swiping a card. Examples of this fare collection method are in the Metro system in Washington, D.C., and Boston subway systems.</p> <p>c. <b>Restricted turnstile.</b> Riders swipe their cards and push through a turnstile to enter and exit the station. This fare collection method results in a much slower evacuation of the station. Turnstiles cannot be held open, so each rider must exit individually through the turnstile or through exit doors, neither of which is able to handle large volumes of people.</p>
8.2.2	<p><b>Quality of Control Systems</b></p> <p>The operational quality of surveillance and control systems in operation based on the age of the equipment.</p>	<p>a. High</p> <p>b. Medium</p> <p>c. Low</p> <p>The screener should note the age of the equipment in the Comments column.</p>

8. Vulnerability Rating: Operations Vulnerabilities		
ID	Station Characteristics	Attribute Options
8.3	<b>Public Address and Communication:</b>	
8.3.1	<p><b>Public Notification (Alerts and Signage for Public Awareness)</b></p> <p>Efforts by the transit agency to implement focused public awareness campaigns for the transit agency employees and traveling public, placing emphasis on public security and emergency awareness. Public awareness programs consist of security and emergency preparedness information materials prominently displayed throughout the system by signage, notifications, alerts, and public announcements.</p> <p>There are two sets of attribute options corresponding to low and high ridership levels (see ID 1.4, Peak Number of Riders/Transfers per Day) and a total of 10 options for this characteristic. Only one attribute option should be selected.</p> <p>Classification of Public Awareness</p> <p><b>Class 1.</b> Public awareness is a limited effort consisting of:</p> <ul style="list-style-type: none"> <li>• Signage</li> <li>• Posters</li> <li>• Public telephones.</li> </ul> <p><b>Class 2.</b> Public awareness is a heightened effort. In addition to Class 1, Class 2 public awareness consists of:</p> <ul style="list-style-type: none"> <li>• Panic alarms (one-way communication)</li> <li>• Audible alerts through public address systems</li> </ul> <p><b>Class 3.</b> The transit system has a dedicated public awareness campaign. In addition to Class 1 and Class 2, Class 3 public awareness consists of:</p> <ul style="list-style-type: none"> <li>• Real-time updates</li> <li>• Visual alert system</li> <li>• Emergency call boxes with two-way communication</li> </ul>	<p>(Low ridership (see ID 1.4))</p> <p>a. Class 3</p> <p>b. Class 2</p> <p>c. Class 1</p> <p>d. Present (non-operational)</p> <p>e. None</p> <p>(High ridership (see ID 1.4))</p> <p>f. Class 3</p> <p>g. Class 2</p> <p>h. Class 1</p> <p>i. Present (non-operational)</p> <p>j. None</p> 
8.3.2	<p><b>Effectiveness of Public Awareness</b></p> <p>Ability and success of the public awareness program to accomplish the following (through public notification, alerts, and signage):</p> <ul style="list-style-type: none"> <li>• Declare a state of an emergency</li> <li>• Urge passengers to report unattended property, suspicious behavior, and security concerns</li> <li>• Display security awareness and emergency preparedness information</li> <li>• Inform passengers of the means to evacuate safely from transit vehicles and/or facilities</li> <li>• Designate restricted areas</li> </ul> <p>All signage should be prominently displayed and legible to the public. Public address systems should be audible.</p>	<p>a. High</p> <p>b. Moderate</p> <p>c. Limited</p>

8. Vulnerability Rating: Operations Vulnerabilities		
ID	Station Characteristics	Attribute Options
8.3.3	<p><b>Asset-Related Communications</b></p> <p>Systems available at the station to facilitate rapid information gathering, decision-making, and response (action taking).</p> <p>Classification of Communications Systems:</p> <p><b>Class 1.</b> Basic interdiction-related communications system that alerts the public to potential threats and provides a means for the public and staff personnel to report suspicious activity. Communications consist of:</p> <ul style="list-style-type: none"> <li>• Hand-held radios</li> <li>• Emergency notification alarm</li> <li>• Cell phones</li> <li>• Telephones</li> </ul> <p><b>Class 2.</b> Enhanced interdiction-related communications system that provides appropriate modes of communication capabilities to security, staff personnel, and public. In addition to Class 1, Class 2 communications consists of:</p> <ul style="list-style-type: none"> <li>• Multi-channelled hand-held radios</li> <li>• GPS</li> <li>• Pagers</li> </ul> <p><b>Class 3.</b> Optimal interdiction-related communications system that provides secure, interoperable, and redundant modes of communication capabilities to security, staff personnel, and appropriate communications for the public. In addition to Class 1 and Class 2, Class 3 communications consist of:</p> <ul style="list-style-type: none"> <li>• Secure communications with multiple channels, frequencies, and additional means should primary means fail</li> <li>• Communications channeled through a dedicated proprietary communications center</li> </ul>	<p><b>(Low ridership (see ID 1.4))</b></p> <p>a. Class 3</p> <p>b. Class 2</p> <p>c. Class 1</p> <p>d. Present (non-operational)</p> <p>e. None</p> <p><b>High ridership (see ID 1.4)</b></p> <p>f. Class 3</p> <p>g. Class 2</p> <p>h. Class 1</p> <p>i. Present (non-operational)</p> <p>j. None</p>
8.3.4	<p><b>Effectiveness of Asset-Related Communications</b></p> <p>Ability and success of the asset-related communications to accomplish the following through hand-held radio, emergency alarms, telephones, and emergency callback boxes:</p> <ul style="list-style-type: none"> <li>• Facilitate rapid information gathering</li> <li>• Facilitate decision-making</li> <li>• Facilitate response and action taking</li> </ul>	<p>a. High</p> <p>b. Moderate</p> <p>c. Limited</p>

8. Vulnerability Rating: Operations Vulnerabilities		
ID	Station Characteristics	Attribute Options
8.4	Quality of Lighting	
8.4.1	<b>Effectiveness of Exterior Lighting</b> <p>The effectiveness of illumination at the approaches to the station. Security lighting should be provided for the overall site to allow security personnel to maintain visual assessment during hours of darkness. Continuous or periodic observation may provide both a real and psychological deterrent because it facilitates detection of unauthorized personnel and makes the job of an attacker more difficult.</p>	<p>a. <b>High.</b> Station approaches are well lit, enhancing lines of sight, and lighting is well maintained.</p> <p>b. <b>Medium.</b> Station approaches have areas where lighting should be improved. Visibility and lines of sight are somewhat impaired or lighting is not well maintained.</p> <p>c. <b>Low.</b> Station exterior lighting is ineffectual or nonexistent.</p>
8.4.2	<b>Sufficiency of Interior Lighting</b> <p>Sufficiency of illumination inside the main functioning areas of the station.</p> <div data-bbox="264 905 937 1327" data-label="Image"> </div> <p>a. <i>Example of high-quality lighting</i></p> <div data-bbox="264 1402 937 1791" data-label="Image"> </div> <p>b. <i>Example of medium-quality lighting (a) High. Lighting for standard operations, such as passenger boarding/disembarkation from transit vehicles, is sufficient</i></p>	<p>a. <b>High.</b> Lighting for standard operations, such as passenger boarding/disembarkation from transit vehicles, is sufficient.</p> <p>b. <b>Medium.</b> Lighting systems either need replacement, basic maintenance, or minor upgrades.</p> <p>c. <b>Low.</b> Facility lighting systems are either nonexistent or of such poor quality that the facility interior is barely passable and other sources of light, such as flashlights, are needed to operate in the station.</p>

Table 4-3g: Catalog of Station Characteristics and Attribute Options for Nonstructural Vulnerabilities

9. Vulnerability Rating: Nonstructural Vulnerabilities		
ID	Station Characteristics	Attribute Options
9.1	<p><b>Quality of Security Personnel Booths</b></p> <p>Provide information on the existence and rating for any law enforcement installations inside or immediately adjacent to the station that act to directly support public safety in the facility.</p>  <p><i>a. Example of high-quality modern security personnel booth facility</i></p>  <p><i>c. Example of low-quality security personnel booth</i></p>	<p>a. <b>High.</b> Modern facility with command and control equipment, intrusion detection, access management controls, permanent structural components, and other features that enable public safety officials to monitor the station complex.</p> <p>b. <b>Medium.</b> Police booths without significant surveillance capabilities and little or no major structural components.</p> <p>c. <b>Low.</b> Temporary or poorly made structure without station surveillance equipment.</p> <p>d. <b>None</b></p>  <p><i>b. Example of medium-quality security personnel booth</i></p>
9.2	<p><b>Fixture Attachments</b></p> <p>Lighting, wiring, piping, and other exposed components.</p>	<p>a. <b>Secured.</b> Fixture attachments are secure from accidental incidents, vandalism, and other acts that might disrupt operations.</p> <p>b. <b>Not secured.</b> Fixture attachments are exposed to accidental events, vandalism, or other acts that might cause a disruption of service.</p>



## 9. Vulnerability Rating: Nonstructural Vulnerabilities






ID	Station Characteristics	Attribute Options
9.2	<p>Fixture Attachment (continued)</p> <div data-bbox="261 375 675 865">  <p>a.</p> </div> <p><i>a. Example of secure fixture attachments.</i></p> <div data-bbox="708 375 1380 865">  <p>b.</p> </div> <p><i>b. Example of fixture attachments that are not secure</i></p>	
9.3	<p>Quality of Barriers/Curbs</p> <p>Existence and effectiveness of barriers and curbs in preventing vehicles from entering the station.</p> <div data-bbox="261 1089 932 1591">  <p>a.</p> </div> <p><i>a. Example of a high-quality barrier</i></p>	<p>a. <b>High.</b> Existing barriers or curbs are of good quality and sufficient to stop a vehicle from entering the station.</p> <p>b. <b>Medium.</b> Existing barriers or curbs are sufficient to stop an accidental impact at the station but would not stop an intentional vehicular attack at the station.</p> <p>c. <b>Low.</b> Barriers or curbs would not stop even an accidental vehicular impact at the station.</p> <p>d. <b>None present</b></p> <div data-bbox="971 1444 1390 1759">  <p>b.</p> </div> <p><i>b. Barrier designed to protect the station entrance from an accidental vehicular impact, but an intentional strike is still possible</i></p>



Table 4-3h: Catalog of Security Systems for Physical Security Vulnerabilities

10a. Vulnerability Rating: Physical Security Vulnerabilities		
ID	Station Characteristics	Attribute Options
10.1a	<p><b>Access Control</b></p> <p>Any combination of equipment and/or guards that can deny entry to unauthorized personnel or vehicles to certain areas of the station. The purpose of the access control is to ensure that only authorized personnel are permitted into or out of a controlled area. Entry can be controlled by locked fence gates, locked doors to a building or rooms within a building, or specially designed portals. The means can be applied manually by guards or automatically by using entry control devices.</p> <p>Examples of access control systems:</p> <ul style="list-style-type: none"> <li>• Fare collection gates</li> <li>• Electronic keypad</li> <li>• Magnetic-stripe card</li> <li>• Proximity card</li> <li>• Smart card</li> <li>• Biometric devices</li> </ul>	<p>a. Yes</p> <p>b. No</p>
10.2a	<p><b>Intrusion Detection Systems (IDS)</b></p> <p>The combination of components, including sensors, control units, transmission lines, and monitor units, integrated to operate in a specific manner. The purpose is to detect an aggressor crossing the boundary of a protected area. The sensors initiate alarm signals by sensing the stimulus, change, or condition for which it was designed.</p> <p>Examples of exterior intrusion detection sensors:</p> <ul style="list-style-type: none"> <li>• Fence</li> <li>• Buried line</li> <li>• Microwave</li> <li>• Infrared</li> </ul> <p>Examples of interior intrusion detection sensors:</p> <ul style="list-style-type: none"> <li>• Boundary penetration</li> <li>• Volumetric motion</li> <li>• Video analytics</li> </ul>	<p>a. Yes</p> <p>b. No</p>

10a. Vulnerability Rating: Physical Security Vulnerabilities		
ID	Station Characteristics	Attribute Options
10.3a	<p><b>Video and Surveillance Assessment – Monitored CCTV</b></p> <p>An electronic system of cameras, control equipment, recorders, and related apparatus used for surveillance or alarm assessment. The system may include event-activated software. Effectiveness of the system depends on proper monitoring, the resolution, and coverage of the cameras.</p> 	<p>a. Yes</p> <p>b. No</p>
10.4a	<p><b>Chemical, Biological, Radiological, Nuclear, Explosive (CBRNE) Detection Equipment</b></p> <p>A variety of technologies and techniques that are in a fixed location to detect the presence or use of CBRNE weapons in real-time.</p> <p>Examples of CBRNE detection equipment:</p> <ul style="list-style-type: none"> <li>• Trace detection equipment</li> <li>• Vapor sampling</li> <li>• CBR identifiers and classifiers</li> <li>• Integrated system</li> </ul>	<p>a. Yes</p> <p>b. No</p>
10.5a	<p><b>Personnel/Baggage CBRNE Screening</b></p> <p>Search and screening are conducted at a fixed check point. Anomalies are verified with K-9 and other CBRNE detection devices.</p>	<p>a. Yes</p> <p>b. No</p>
10.6a	<p><b>Vehicular CBRNE Screening</b></p> <p>Vehicles are searched and screened at fixed checkpoints. Anomalies are verified with K-9 and other CBRNE detection devices.</p>	<p>a. Yes</p> <p>b. No</p>
10.7a	<p><b>Mobile Personnel/Baggage CBRNE Screening</b></p> <p>Random searches are conducted of personnel and baggage, typically by a roving team of personnel with appropriate equipment and an explosive K-9 Unit.</p>	<p>a. Yes</p> <p>b. No</p>

10a. Vulnerability Rating: Physical Security Vulnerabilities		
ID	Station Characteristics	Attribute Options
10.8a	<b>Unarmed Guards/Patrol</b> Security guards at the station carry no firearms and are responsible for detecting, deterring, observing, and reporting malicious behavior.	a. Yes b. No
10.9a	<b>Armed Guards/Patrols</b> Security guards patrolling at the station are armed and meet all appropriate jurisdiction standards. The guard/patrol is responsible for reporting incidents and has a limited interdiction capability.	a. Yes b. No
10.10a	<b>Law Enforcement Patrols</b> Sworn law enforcement personnel patrol during specified hours or randomly patrol the station.	a. Yes b. No
10.11a	<b>Asset Related Communications</b> Security communication systems that facilitate rapid information gathering, decision-making, and actions (response). Examples: <ul style="list-style-type: none"> <li>• Pagers</li> <li>• GPS</li> <li>• Multi-channelled hand-held radios</li> <li>• Two-way radio</li> <li>• Direct ring-down intercoms</li> <li>• Standard telephone landlines</li> <li>• Wireless phones</li> <li>• Emergency notification alarm</li> </ul>	a. Yes b. No
10.12a	<b>Special Weapons and Tactics (SWAT) Teams</b> A special tactical unit trained for multiple special operations that is either full-time to the transit system or provided by the local law enforcement. The SWAT team is trained in counterterrorism and possesses specialized skills in explosive breaching, sharpshooter capability, hostage rescue, etc.	a. Yes b. No
10.13a	<b>10.13 Explosion Ordinance Disposal (EOD) Teams</b> A special team either full-time dedicated to the transit system or provided by the local law enforcement who are trained to be used as a bomb squad when needed.	a. Yes b. No

10a. Vulnerability Rating: Physical Security Vulnerabilities		
ID	Station Characteristics	Attribute Options
10.14a	<b>Interdiction-related Communications</b> Security communication systems that facilitate rapid information gathering, decision-making, and actions (response) to interdict a threat	a. Yes b. No
	<b>Waterside Security Systems</b> Applicable to mass transit stations located above or adjacent to a body of water.	
10.15a	<b>Waterside Intrusion Detection Systems (IDS)</b> Appropriate detection technologies capable of detecting smaller water craft, swimmers, divers, or objects at varying distances and depths from the tunnel (DHS, 2002).	a. Yes b. No
10.16a	<b>Vessel Boarding Teams</b> Team with the ability to board vessels near the tunnel in security or emergency situations (DHS, 2002).	a. Yes b. No
10.17a	<b>Dive Teams</b> Team with the capability to dive into the water surrounding the tunnel for security purposes (DHS, 2002).	a. Yes b. No
10.18a	<b>Patrol Boats</b> Vessels used for emergency response at the tunnel.	a. Yes b. No
10.19a	<b>Unarmed Guards (Waterside)</b> Security guards at the station waterside carry no firearms and are responsible for detecting, deterring, observing, and reporting malicious behavior.	a. Yes b. No
10.20a	<b>Unarmed Guards (Waterside)</b> Security guards at the station waterside carry no firearms and are responsible for detecting, deterring, observing, and reporting malicious behavior.	a. Yes b. No
10.21a	<b>Armed Guards (Waterside)</b> Security guards patrolling at the station waterside are armed and meet all appropriate jurisdiction standards. The guard/patrol is responsible for reporting incidents and has a limited interdiction capability.	a. Yes b. No
10.22a	<b>Law Enforcement Patrols (Waterside)</b> Sworn law enforcement personnel patrol during specified hours or randomly patrol the station waterside.	a. Yes b. No

10b. Vulnerability Rating: Physical Security Vulnerabilities		
ID	Station Characteristics	Attribute Options
10.1b	<b>Blast Threat: Internal</b> Intrusion into the transit station by a person or persons with the intent to attack the transit station with an explosive device.	
10.1.1b	<b>Number of Systems</b> Number of security systems available to protect against the threat of an explosion inside the subway station. This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 8 or more b. 4 to 7 c. 1 to 3 d. None
10.1.2b	<b>Overall Security Effectiveness</b> Ability and success of the collective security systems to protect against the threat of an explosion inside the transit station. The number of detection systems available will have little impact if the systems are not effective in thwarting attacks.	a. High b. Effective c. Minimal d. Ineffective e. No security
10.2b	<b>Blast Threat: External (Direct)</b> Use of an explosive device to attack the transit station from the exterior. In this case, the transit station is the primary target.	
10.2.1b	<b>Number of Systems</b> Number of security systems available to protect against an explosion outside the transit station. This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 5 or more b. 3 to 4 c. 1 to 2 d. None
10.2.2b	<b>Overall Security Effectiveness</b> Ability and success of the collective security systems to protect against the threat of an explosion directed at the transit station from the exterior. The number of detection systems available will have little impact if the systems are not effective in thwarting attacks.	a. High b. Effective c. Minimal d. Ineffective e. No security
10.3b	<b>Blast Threat: External (Collateral)</b> An attack with explosive devices on a target within a 300-foot radius of the transit station e.g., a bomb explosion in a plaza adjacent to a transit station.. The transit station is not the primary target but would be susceptible to collateral effects.	
10.3.1b	<b>Number of Systems</b> Number of security systems available to detect the threat of an explosive attack on a target within 300-feet of the transit station. The station is not the primary target but would be susceptible to collateral effects. The detection systems may be separate from security operations of the station. Redundant systems are highly desirable. This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 5 or more b. 3 to 4 c. 1 to 2 d. None

10b. Vulnerability Rating: Physical Security Vulnerabilities		
ID	Station Characteristics	Attribute Options
10.3.2b	<b>Overall Security Effectiveness</b> Ability and success of collective security systems to protect the transit station against the collateral effects of an explosive attack on another target within 300 feet. The number of detection systems available will have little effect if the systems are not effective in thwarting attacks.	a. High b. Effective c. Minimal d. Ineffective e. No security
10.4b	<b>CBR Threat: Internal</b> The ground release of a CBR agent inside the transit station.	
10.4.1b	<b>Number of Systems</b> Number of security systems available to detect the threat of a CBR release inside the station. Detection systems include access control, screening systems, sensors, video surveillance and assessment, security lighting, and security guards. Redundant systems are desirable. This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 5 or more b. 3 to 4 c. 1 to 2 d. None
10.4.2b	<b>Overall Security Effectiveness</b> Ability and success of the collective security systems to protect against the threat of a CBR release inside the station. The number of detection systems available will have little effect if the systems are not effective in thwarting attacks.	a. High b. Effective c. Minimal d. Ineffective e. No security
10.5b	<b>CBR Threat: Tunnel</b> The release of a CBR agent inside the tunnel of the transit system serving the station.	
10.5.1b	<b>Number of Systems</b> Number of systems available detect the threat of a CBR release inside the tunnel of the station. Detection systems include access control, screening systems, sensors, video surveillance and assessment, security lighting, and security guards. Redundant systems are highly desirable. This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 5 or more b. 3 to 4 c. 1 to 2 d. None
10.5.2b	<b>Overall Security Effectiveness</b> Ability and success of the collective security systems to protect against the threat of a CBR release inside the tunnel of the station. The number of detection systems available will have little effect if the systems are not effective in thwarting attacks.	a. High b. Effective c. Minimal d. Ineffective e. No security



10b. Vulnerability Rating: Physical Security Vulnerabilities		
ID	Station Characteristics	Attribute Options
10.6	<b>CBR Threat: External</b> The ground release of a CBR agent from the exterior of the transit station	
10.6.1b	<b>Number of Systems</b> Number of detection systems available to detect the threat of a CBR release outside the station. This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 5 or more b. 3 to 4 c. 1 to 2 d. None
10.6.2b	<b>Overall Security Effectiveness</b> Ability and success of the collective security systems to protect the station against the threat of a CBR release outside the transit station. The number of detection systems available will have little effect if the systems are not effective in thwarting attacks.	a. High b. Effective c. Minimal d. Ineffective e. No security
10.7b	<b>Fire Threat: Internal</b> A fire threat inside the transit station that threatens the operations and users of the transit station itself.	
10.7.1b	<b>Number of Systems</b> Number of detection systems available to protect against the threat of a fire inside the station. This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 5 or more b. 3 to 4 c. 1 to 2 d. None
10.7.2b	<b>Overall Security Effectiveness</b> Ability and success of the collective security systems to protect the station against the threat of a fire inside the station. The number of detection systems available will have little effect if the systems are not effective in warning of or preventing fire.	a. High b. Effective c. Minimal d. Ineffective e. No security
10.8b	<b>Fire Threat: External</b> A fire threat outside the transit station that threatens the operations of the transit station itself. An example is a transit station next to or under a building that is on fire, thus threatening the operations and structure of the transit station.	
10.8.1b	<b>Number of Systems</b> Number of detection systems available to protect against the threat of a fire outside the station. This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 5 or more b. 3 to 4 c. 1 to 2 d. None
10.8.2b	<b>Overall Security Effectiveness</b> Ability and success of the systems to protect the station against the threat of a fire outside the station. The number of detection systems available will have little effect if the systems are not effective in warning of or preventing fire	a. High b. Effective c. Minimal d. Ineffective e. No security

10b. Vulnerability Rating: Physical Security Vulnerabilities		
ID	Station Characteristics	Attribute Options
10.9b	<b>Fire Threat: Tunnel/Track/Smoke</b> Fire or smoke in the tube of the tunnel connected to the transit station from the tracks of trains that threatens the life safety, operations, and structure of the transit station.	
10.9.1b	<b>Number of Systems</b> Number of detection systems available to protect against the threat of fire or smoke in the tunnels connected to the station. This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 5 or more b. 3 to 4 c. 1 to 2 d. None
10.9.2b	<b>Overall Security Effectiveness</b> Ability and success of the systems to protect the station against the threat of fire or smoke in the tunnel connected to the station. The number of detection systems available will have little effect if the systems are not effective in warning of or preventing fire.	a. High b. Effective c. Minimal d. Ineffective e. No security
10.10b	<b>Other Threats: Flood/Flooding</b> An event causing the transit station to be submerged in water threatening the operations and users of the station.	
10.10.1b	<b>Number of Systems</b> Number of detection systems available to protect against the threat flooding in the station. This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 5 or more b. 3 to 4 c. 1 to 2 d. None
10.10.2b	<b>Overall Security Effectiveness</b> Ability and success of the systems to protect the station against the threat of flooding inside the station. The number of detection systems available will have little effect if the systems are not effective in warning of or preventing flooding.	a. High b. Effective c. Minimal d. Ineffective e. No security
10.11b	<b>Other Threats: Collision Grade/Tunnel/Elevated.</b> Collision describes a vehicular impact to the transit station causing damage to the structure and threatening operations. This includes collisions at grade, in the tunnel, or elevated.	
10.11.1b	<b>Number of Systems</b> Number of detection systems available to protect against the threat of a vehicular collision into the station. This characteristic is automatically summed in the IRVS Database using the general security system checklist	a. 5 or more b. 3 to 4 c. 1 to 2 d. None

10b. Vulnerability Rating: Physical Security Vulnerabilities		
ID	Station Characteristics	Attribute Options
10.11.2b	<b>Overall Security Effectiveness</b>  Ability and success of the systems to protect the station against the threat of a vehicular collision into the station. The number of detection systems available will have little effect if the systems are not effective in warning of or preventing collisions.	a. High b. Effective c. Minimal d. Ineffective e. No security
10.12b	<b>Other Threats: Cyber</b>  An attack on the transit station through any combination of facilities, equipment, personnel, procedures, and communications integrated through cyber networks or control systems.	
10.12.1b	<b>Number of Systems</b>  Number of detection systems available to protect against the threat of a cyber attack on the station.  This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 5 or more b. 3 to 4 c. 1 to 2 d. None
10.12.2b	<b>Overall Security Effectiveness</b>  Ability and success of the collective security systems to protect the station against the threat of a cyber attack on the station. The number of detection systems available will have little effect if the systems are not effective in thwarting attacks.	a. High b. Effective c. Minimal d. Ineffective e. No security

Table 4-3i: Catalog of Station Characteristics and Attribute Options for Cyber Vulnerabilities

11. Vulnerability Rating: Cyber Vulnerabilities		
ID	Station Characteristics	Attribute Options
11.1	<b>Effectiveness of Cyber Security Plan</b>  How well the security in place protects systems, such as the supervisory control and data acquisition (SCADA) or utility monitoring and control systems (UMCS), which provide monitoring and control of utilities within buildings or the electronic security system. Many station operation systems use the Internet to perform these functions, so cyber security must be a priority because the systems are accessible to all attackers with a computer and access to the Internet. The best protection for these systems is to remove them from the Internet; when that is not feasible, other protective features must be put in place.	a. High b. Medium c. Low d. None
11.2	<b>Effectiveness of Training Programs</b>  Effectiveness of the programs in place to train transit station employees on the cyber security measures in place.	a. High b. Medium c. Low d. None

11. Vulnerability Rating: Cyber Vulnerabilities		
ID	Station Characteristics	Attribute Options
11.3	<b>Security of Communication, Signal, and Power Systems</b> Measures in place to protect the communication system, signal system, and power supply to the transit station.	a. Secured b. Medium c. Marginal d. No security
11.4	<b>Redundancy of Communication Systems</b> The station's ability to operate communications systems if the primary system is compromised.	a. Yes b. No
11.5	<b>Security of Power Supply</b> Measures in place to protect the power supply to the transit station. The power supply ensures that all communications and security measures are functioning.	a. Secured b. Medium c. Marginal d. No security
11.6	<b>Effectiveness of Wireless, Radio, or Satellite Systems During Emergencies</b> Whether these communication modes can function effectively to deliver important messages to and from the transit station if other systems are compromised.	a. High (regional) b. Medium (within jurisdiction) c. Low (system only)

Table 4-3j: Catalog of Station Characteristics and Attribute Options for Operational Security Vulnerabilities

12. Vulnerability Rating: Operational Security Vulnerabilities		
ID	Station Characteristics	Attribute Options
12.1	<b>Emergency Plan</b> The transit agency has prepared an emergency plan, with procedures and protocols, to use in the event of a disaster. The purpose of emergency plans is to reduce the impact of disasters. By implementing the emergency plan, a transit agency can enhance its capability to respond to and recover from and mitigate against an act of terrorism or natural disaster.	a. Yes b. No
12.2	<b>Emergency Response Exercises</b> A well-rehearsed emergency plan enables efficient coordination of rescue and response operations. Drills and training can improve how people function during emergencies.	a. Full scale b. Table top c. Workshop d. None

12. Vulnerability Rating: Operational Security Vulnerabilities		
ID	Station Characteristics	Attribute Options
12.3	<p><b>Effectiveness of Emergency Plans</b></p> <p>Ability and success of the emergency/security response plans implemented by the station. Just having a plan does not protect the station; if the plan is not effective, the station will not be prepared to respond to an emergency.</p> <p>Characteristics of an effective emergency/security response plan are:</p> <ul style="list-style-type: none"> <li>• Communication plans with easily understandable terminology and methods</li> <li>• Development and exercise of warnings combined with planned areas of refuge and evacuation plans</li> <li>• Development of organizations of trained volunteers among civilian populations such as, Community Emergency Response Teams</li> </ul>	<p>a. High</p> <p>b. Effective</p> <p>c. Minimal</p> <p>d. Ineffective</p>
12.4	<p><b>Security Plan</b></p> <p>The transit agency has prepared a security plan which includes details on how the protective systems, continuity of operations, and other emergency systems will be handled. Included are general plans for system redundancy, memoranda of understanding for response force support, and notification requirements.</p>	<p>a. Yes</p> <p>b. No</p>
12.5	<p><b>Security Plan Update Status</b></p> <p>Length of time since security plans were last updated. Security plans should be reviewed and updated annually to incorporate changes in threat intelligence.</p>	<p>a. Within 12 months</p> <p>b. 1 to 2 years</p> <p>c. 2 to 5 years</p> <p>d. More than 5 years</p> <p>e. None</p>
12.6	<p><b>Transit Agency Mass Evacuation Plan</b></p> <p>The transit agency has a procedure for the immediate and rapid movement of people out of the station in the event of an emergency.</p> <p>Mass evacuation plans are developed to ensure the safest and most efficient evacuation time for all people in the station.</p>	<p>a. Yes</p> <p>b. No</p>

12. Vulnerability Rating: Operational Security Vulnerabilities		
ID	Station Characteristics	Attribute Options
12.7	<p><b>Effective of Mass Evacuation Plan</b></p> <p>Ability and success of the mass evacuation plan. An effective evacuation plan uses multiple exits and technologies to ensure full and complete evacuation. The transit agency should post procedures for safe evacuation prominently in the station.</p> <p>The screener should consider the phases of evacuation when determining the effectiveness of the evacuation plan.</p> <ol style="list-style-type: none"> <li>1. Detection</li> <li>2. Decision</li> <li>3. Alarm</li> <li>4. Reaction</li> <li>5. Movement to area of refuge or assembly station</li> <li>6. Transportation</li> </ol>	<ol style="list-style-type: none"> <li>a. High</li> <li>b. Effective</li> <li>c. Minimal</li> <li>d. Ineffective</li> </ol>
12.8	<p><b>Continuity of Security</b></p> <p>Security and protective measures are maintained during off-peak or closing hours; if not, the station is more vulnerable.</p>	<ol style="list-style-type: none"> <li>a. Yes</li> <li>b. No</li> </ol>
12.9	<p><b>Report/Exchange Threat Information</b></p> <p>How often the transit agency receives and exchanges threat information with local, State, and Federal law enforcement officials.</p>	<ol style="list-style-type: none"> <li>a. Frequent</li> <li>b. Seldom/infrequent</li> <li>c. None</li> </ol>
12.10	<p><b>Training Programs</b></p> <p>Training is provided to all transit employees regarding security awareness and emergency response.</p> <p>Training and education for transit personnel (security, maintenance, and operations) is essential because it is the engagement and decision-making of these individuals, operating in their own areas of expertise and responsibility, that will determine the success of emergency preparedness and response. Objectives for training are:</p> <ul style="list-style-type: none"> <li>• Develop employee awareness of potential threats or hazards. Employees should be able to recognize, report, and respond appropriately to suspicious items.</li> <li>• Develop an understanding of responses and protective actions and what to do for each of the possible emergency situations.</li> </ul>	<ol style="list-style-type: none"> <li>a. Well established</li> <li>b. Marginal</li> <li>c. None</li> </ol>



12. Vulnerability Rating: Operational Security Vulnerabilities		
ID	Station Characteristics	Attribute Options
12.11	<p><b>Coordinated Efforts of Local/Regional First Responders</b></p> <p>A mutual-aid agreement should be established between the transit agency and entities in the area that would be called upon to supplement the agency's resources during an emergency. The collaboration should include:</p> <ul style="list-style-type: none"> <li>• Coordinated exercises with both entities for emergency preparedness and response</li> <li>• Sharing of emergency response and security protocols</li> <li>• Information sharing capabilities (e.g., contacts, procedures, resource inventories)</li> <li>• Interoperable communications systems with first responders (</li> </ul>	<p>a. Well established</p> <p>b. Marginal</p> <p>c. None</p>



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# Acronyms

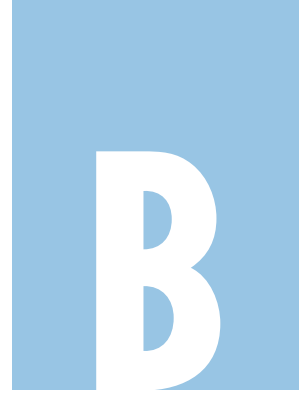
<b>BIPS</b>	Buildings and Infrastructure Protection Series
<b>C</b>	consequences
<b>CBR</b>	chemical, biological, and radiological
<b>CBRNE</b>	chemical, biological, radiological, nuclear, explosive
<b>CCTV</b>	closed circuit television
<b>CIKR</b>	Critical Infrastructure and Key Resources
<b>DCF</b>	Data Collection Form
<b>DHS</b>	Department of Homeland Security
<b>EOD</b>	explosive ordinance disposal teams
<b>FEMA</b>	Federal Emergency Management Agency
<b>HSPD</b>	Homeland Security Presidential Directorate
<b>HVAC</b>	heating, ventilation, and air conditioning



## ACRONYMS

<b>IDD</b>	Infrastructure Protection and Disaster Management Division
<b>IDS</b>	intrusion detection system
<b>IRVS</b>	integrated rapid visual screening for mass transit stations
<b>MBTA</b>	Massachusetts Bay Transportation Authority
<b>MS</b>	Microsoft
<b>MTS</b>	mass transit station
<b>NIPP</b>	National Infrastructure Protection Plan
<b>PANYNJ</b>	Port Authority of New York & New Jersey
<b>RMS</b>	Risk Management Series
<b>S&amp;T</b>	Science and Technology Directorate
<b>SCADA</b>	supervisory control and data acquisition
<b>SWAT</b>	special weapons and tactics teams
<b>T</b>	threat
<b>TSA</b>	Transportation Security Administration
<b>UMCS</b>	utility monitoring and control systems
<b>V</b>	vulnerabilities





# Glossary

**Access control.** Any combination of barriers, gates, electronic security equipment, and/or guards that can deny entry to unauthorized personnel or vehicles.

**Aggressor.** Any person seeking to compromise a function or structure.

**Assessment.** The evaluation and interpretation of measurements and other information to provide a basis for decision-making.

**Asset.** Person, structure, facility, information, material, or process that has value.

**Asset-related communications.** Systems available to facilitate rapid information gathering, decision-making, and response (action taking).

**Attack.** Hostile action resulting in the destruction, injury, or death to the civilian population or damage or destruction to public and private property.

**Attribute.** Subcategory of characteristic. For example, station elevation is a characteristic, and a below-grade elevation is the attribute. Attributes are presented in the electronic software in a drop down menu. In paper version of the data collection form, attribute options are presented in columns “a” to “e.”

**Biological agent.** Living organisms or the materials derived from them that cause disease or harm to humans, animals, or plants or cause deterioration of material. Biological agents may be in liquid droplets, aerosols, or dry powders.

**Business continuity.** Ability of an organization to continue to function during and after a disaster.

**Catalog.** List of station characteristics and attributes that are assessed in the IRVS of mass transit stations. The catalog includes guidance on selecting attributes.

**Catenary.** System of overhead trolley wires that carry electric current, in which the contact wire is hung from another wire that hangs in a catenary curve; also, any or all of the overhead trolley wire system.

**Characteristic.** Physical component, functionality, or operation of a mass transit station that is evaluated in the IRVS procedure and listed on the Data Collection Form.

**Chemical agent.** Chemical substance that is intended to kill, seriously injure, or incapacitate people through physiological effects.

**Closed circuit television.** Electronic system of cameras, control equipment, recorders, and related apparatus used for surveillance or alarm assessment.

**Collateral damage.** Injury or damage to assets that are not the primary target of an attack.

**Concourse.** Open space that accommodates large crowds and allows for efficient distribution of people between locations.

**Consequence.** Effect of an event, incident, or occurrence. Consequences are divided into four categories: public health and safety, economic, psychological, and governance impacts.

**Consequences rating.** Degree of debilitation that would be caused by the incapacity or destruction of an asset.

**Control center.** Centrally located room or facility staffed by personnel charged with the oversight of specific situations and/or equipment.

**Control system.** Computer-based system used in many types of infrastructure and in many industries to monitor and control sensitive processes or physical functions.

**Controlled area.** Area into which access is controlled or limited; portion of a restricted area that is usually near or surrounding a limited or exclusion area.

**Critical Infrastructure.** Vital system or asset, either physical or virtual, that the incapacity or destruction of which may have a debilitating impact on the security, economy, public health or safety, environment, or any combination, across a Federal, State, regional, territorial, or local jurisdiction.

**Cyber security.** Protection that is intended to prevent damage to, unauthorized use of, or exploitation of, and if needed, restoration of electronic information and communications systems. Includes protection of information networks and wireline, wireless, satellite, public safety answering points, and communication and control systems.

**Data Collection Form.** Form containing the station characteristics and attribute options that is used in the IRVS of mass transit stations.

**Deterrence.** Inhibition of criminal behavior by fear especially of punishment.

**Direct loss.** Cost to rebuild, respond, and recover from an event.

**Disaster.** Natural catastrophe, technological accident, or human-caused event that results in severe property damage, deaths, and/or multiple injuries.

**Downtime.** Disruption of a service that is the result of an event, incident, or occurrence.

**Emergency.** Any natural or human-caused situation that results in or may result in substantial injury or harm to the population or substantial damage to or loss of property.

**First responder.** Local police, fire, and emergency medical personnel who arrive first on the scene of an incident and take action to save lives, protect property, and meet basic human needs.

**Flood.** Temporary, partial or complete inundation of normally dry land areas from overflow of inland or tidal waters, unusual or rapid

accumulation or runoff of surface waters, or mudslides/mudflows caused by accumulation of water.

**Hazard.** Natural or manmade source or cause of harm or difficulty.

**Hazardous material.** Any substance or material that, when involved in an accident and released in sufficient quantities, poses a risk to people's health, safety, and/or property. Includes explosives, radioactive materials, flammable liquids or solids, combustible liquids or solids, poisons, oxidizers, toxins, and corrosive materials.

**Heavy rail.** Electric railway with the capacity to handle a heavy volume of passengers.

**Indirect loss.** Downstream costs resulting from disruption of the service after an event.

**Integrated rapid visual screening.** Quick and simple procedure to assess the risk and resiliency of a mass transit station.

**Intermodal.** More than one mode of transportation (e.g., rail, bus, air).

**Intrusion detection system.** Combination of sensors, control units, transmission lines, and monitor units, integrated to operate in a specified manner.

**IRVS Tier 1 assessment.** Screening that identifies the primary facility vulnerabilities and.

**IRVS Tier 2 assessment.** Onsite evaluation by assessment specialists that provides a robust evaluation of system interdependencies, vulnerabilities, and mitigation options.

**Key Resource.** Publicly or privately controlled resource essential to the minimal operation of the economy and government.

**Light rail.** System characterized by vehicles that require an operator and are powered by overhead electric catenary or trolley wires. Often some portion of the route runs in the streets of cities or towns (as opposed to a heavy rail system in which vehicles operate on a private right-of-way). Modern equivalent of a trolley or interurban.

**Liner.** Roof/wall of underground stations or tunnels.

**Liner relative thickness.** Thickness of the structural roof/wall outlining an underground station to tunnel.

**Line.** Transportation route that is typically distinguished by numbering, name, or color.

**Lobby.** Area with station attendants and fair collection machines.

**Mass transit station.** Structure acting as a terminal, typically underground or elevated, serving a mode of transportation for a mass transit system.

**Mezzanine.** Intermediate story in a station that projects in the form of a balcony.

**Mitigation.** Ongoing and sustained action to reduce the probability of or lessen the impact of an adverse incident.

**Natural protective barrier.** Mountains, deserts, cliffs, ditches, water obstacles, or other terrain feature that is difficult to traverse.

**Owner/operator.** Entity responsible for day-to-day operation and investment in a particular asset or system.

**Physical security.** Measures/concepts designed to safeguard personnel; prevent unauthorized access to equipment, installations, material, and documents; and safeguard them against espionage, sabotage, damage, and theft.

**Platform.** Section of pathway, along rail tracks at a train station, metro station, or tram stop, at which passengers may board or alight from.

**Prioritization.** Process of using risk assessment results to identify where risk reduction or mitigation efforts are most needed and determination of which protective actions should be instituted in order to have the greatest effect.

**Progressive collapse.** A chain reaction failure of structural members to an extent disproportionate to the original localized damage. Such damage may result in upper floors collapsing onto lower floors.

**Rapid transit.** Electric railway characterized by high speed and rapid acceleration. Uses passenger railcars operating singly or in multiple unit trains on fixed rails, operates on separate rights-of-way from which all other vehicular and foot traffic are excluded, and uses sophisticated signaling systems and high platform loading.

**Replacement value.** Current market cost to construct the asset.

**Resilience.** Ability to resist, absorb, recover from, or successfully adapt to adversity or a change in conditions.

**Resilience Score.** A numeric value that describes the ability of a mass transit station to resist, absorb, and recover from a potentially disruptive event at a mass transit station.

**Risk.** Potential for an unwanted outcome resulting from an incident, event, or occurrence, as determined by its likelihood and the associated consequences.

**Risk score.** Numerical value obtained from the IRVS that describes the risk to a station for a terrorist attack or natural disaster

**Sector.** Logical collection of assets, systems, or networks that provide a common function to the economy, government, or society.

**Signal.** Provides information to the train driver about the line ahead.

**Signal box.** Building or room that houses signal levers or a control panel.

**Social impact.** Psychological effect on public morale and confidence as a result of an event.

**Stand-off distance.** Distance maintained between a building and the potential location for an explosive detonation or other threat.

**Subway.** Underground railroad, generally in a large city. Considered heavy rail because it operates on a dedicated track.

**Target density.** Number of potential high-value targets surrounding a mass transit station.

**Terrorism.** Unlawful use of force and violence against persons or property to intimidate or coerce a government, civilian population, or any segment thereof in furtherance of political or social objectives.

**Third rail.** Rail running parallel to one of the two running rails of a track; carries a supply of electricity used to power electric cars or locomotives.

**Threat.** Natural or manmade occurrence, individual, entity, or action that has or indicates the potential to harm life, information, operations, the environment, and/or property.



**Threat rating.** Likelihood or potential of the occurrence of manmade or natural hazard.

**Transportation hub.** Place where passengers and cargo are exchanged between vehicles or transport modes. Includes train stations, mass transit stations, bus stops, tram stops, airports, and ferry slips.

**Vulnerability.** Physical feature or operational attribute that renders an entity open to exploitation or susceptible to a given hazard.

**Vulnerability rating.** Weakness of functions, systems, and sites in regard to a particular threat/hazard.

**Yard.** System or grouping of tracks connected to, but not part of, a main line; used for switching or storing cars, or making up trains.





# Integrated Rapid Visual Screening (IRVS) Database User Guide





## Section 1: Overview and Installation

- Introduction
- Database Overview
- System Requirements
- Installation Process

### Introduction

**T**his database application is provided to support the Integrated Rapid Visual Screening (IRVS) methodology. The database, titled IRVS Database, is a multi-purpose tool that currently supports IRVS screenings of 1) Mass Transit Stations, 2) Buildings, and 3) Tunnels. This User Guide provides information on how to install the database, use the database to conduct an IRVS screening and to perform system administrative functions.

### Database Overview

The IRVS Database is a standalone application that is both a data collection tool and a data management tool. Screeners can use the tool to assist in the systematic collection, storage and reporting of IRVS data. It has functions, folders and displays to collect and display screening data, risk summary scores, digital photos, site plans, floor plans, emergency plans, and certain GIS products as part of the IRVS record of screenings. Managers can use the application to store, search and analyze data collected from multiple screenings, and then print a variety of reports.

The IRVS Database is a standalone application that is both a data collection tool and a data management tool.

The database is designed for an organization to transfer screening information between two or more copies of the database: one (or more) copies of the database loaded on the screening team laptop(s) and for collecting data in the field; and one copy of the database loaded on a computer at an organization's headquarters for collecting the results, printing reports, and analyzing the information from a number of screenings. The temporary database used in the field by a screening team is referred to in this guide as the Field Database. The primary database copy at an organization's headquarters is referred to in this guide as the Master Database.

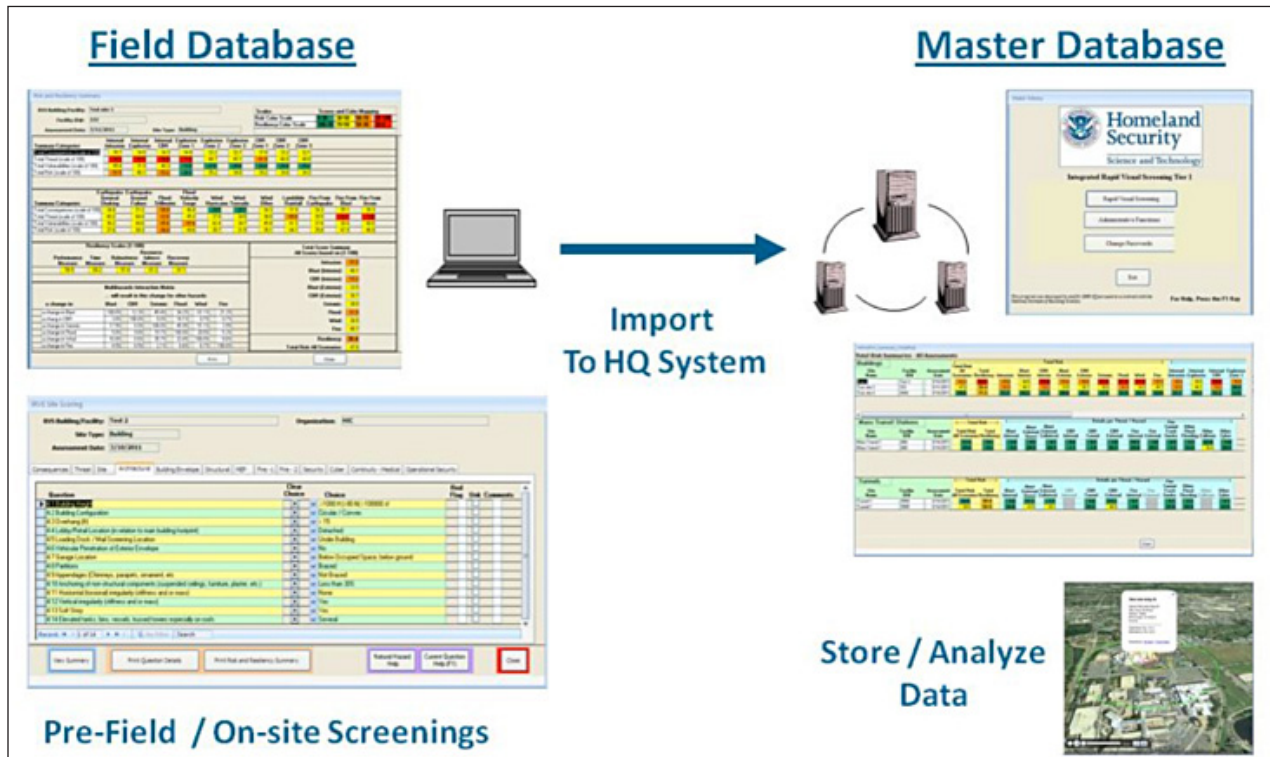
The database on a screener's laptop, referred to in this guide as the Field Database, is used to perform the following functions:

- Create the screening record, to include site identification, address, sector and subsector identification, site importance, and geographical coordinates
- Create an Executive Summary of the screening as well as a list of the screening team and site points of contact
- Record Pre-Field data entry: Hazards, Pre-Field Questions, and Structure Type.
- Record Site Evaluation data entry
- Display the site's Risk Summary
- Create folders and displays of collected digital photos, site plans, floor plans, emergency plans, and certain GIS products
- Transfer the collected IRVS data to the organization's Master Database
- Purge the collected data from the Field Database laptop and prepare it for subsequent screenings

The primary database at an organization's headquarters, referred to in this guide as the Master Database, is used by managers to store, search print, display and analyze data collected from multiple screenings. Capabilities include:

- Import collected IRVS data from Field Team databases
- Store, search and analyze data on multiple IRVS screenings
- Display and print a variety of reports
- Identify mitigation strategies
- Create a duplicate of an IRVS record for mitigation analysis or "What if" impacts resulting from changes to the Consequence, Threat, Vulnerability and Resiliency status
- Produce standard reports or export report data as a MS Word® or PDF® document for additional editing and formatting
- Export screening risk data to MS Excel® spreadsheets for additional editing and tracking
- Filter and sort screening records by site identification, address, sector and subsector identification, and facility importance
- Plot and display IRVS screening sites and risk values on the users digital mapping program
- Display the Total Risk Summary for one site or for a filtered list of sites.

- Store, display, and print collected digital photos, site plans, floor plans, emergency plans, certain GIS products, and other miscellaneous files collected during screenings
- Perform Database Administrative functions



## System Requirements

The following are the hardware and software requirements for the basic IRVS Database:

- Pentium® 4 or equivalent processor
- Windows XP®
- MS Access® 2003 or later
- MS Excel® 2003 or later
- 256 MB of RAM recommended for all components
- Adobe Reader®



The database has an optional plotting function to display IRVS site coordinates and screening information on a digital map. The plotting function requires the use of a systems existing mapping program capable of displaying a KML type file, such as Google Earth®. (Keyhole Markup Language (KML) is an XML-based language for defining the display of three-dimensional spatial data in the programs like Google Earth®.)

Reminder: the database must be opened using the shortcut installed during the initial setup.

## Installation Process

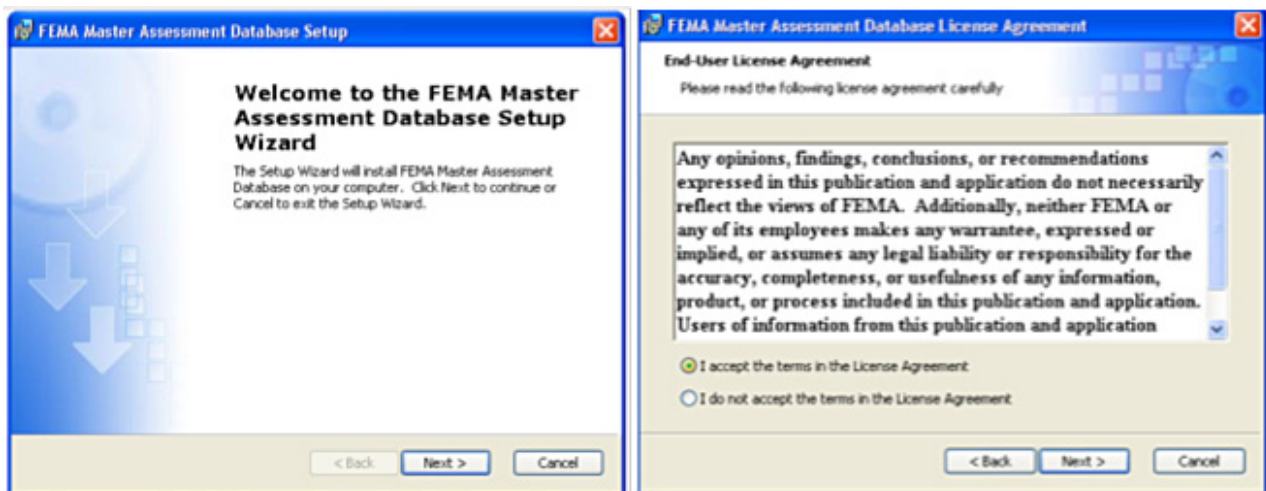
Download and install the database program from the DHS website: **XXXXXXX**. Follow the download and self installation instructions on the DHS website. It is recommended to install the database on two separate systems: one to use as the IRVS Master Database and one to use as a temporary database on an IRVS screener's system.

After downloading the program, begin the installation process by first closing all other programs and then double left click on the SETUP.EXE file. Note: If the program was previously downloaded to you computer, left click **Start, Run**, identify the location where the SETUP.EXE program can be found (CD, C:/Temp, or some other storage location on hard drive or media) and then left click on the SETUP.EXE file.

## Install Wizard

The Install Wizard first identifies the name of the software being installed. Left click **Next** to continue after confirming that this is the software you want to install.

**NOTE THESE ARE PLACE HOLDER PICTURES**



## End User License Agreement (EULA)

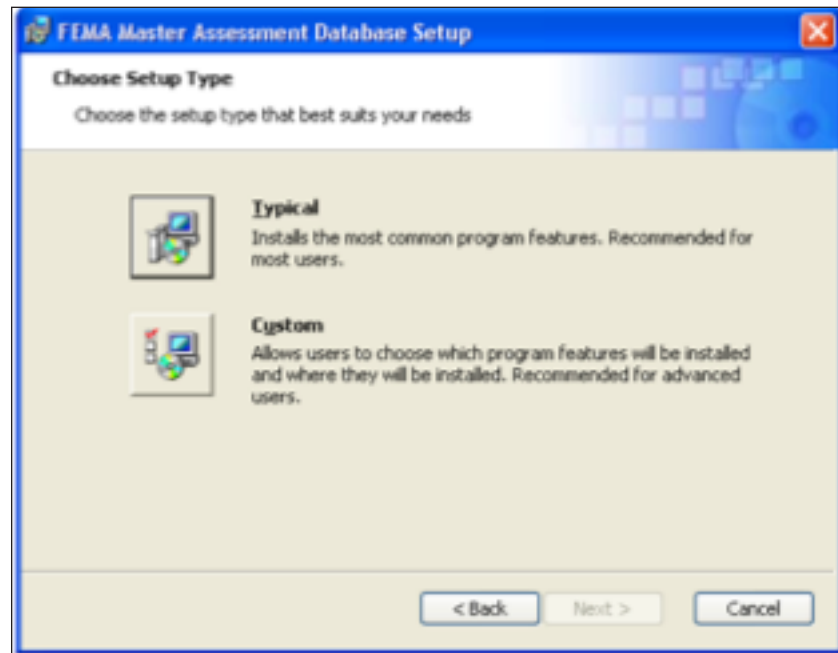
A standard screen showing the End User License Agreement will appear. Read as you feel appropriate, then left click on the **Accept** circle, and left click on **Next** to continue with the installation.

## Customer Information

Add the User Name and Organization in the appropriate windows. Continue with the installation by left clicking Next.

## Typical Installation

There is no advantage in using the Custom Installation. There are no component programs to select. The only feature that the Custom Installation allows is to change the file name and/or file location. In most cases you should follow the Typical Installation. To proceed, left click on **Typical**.



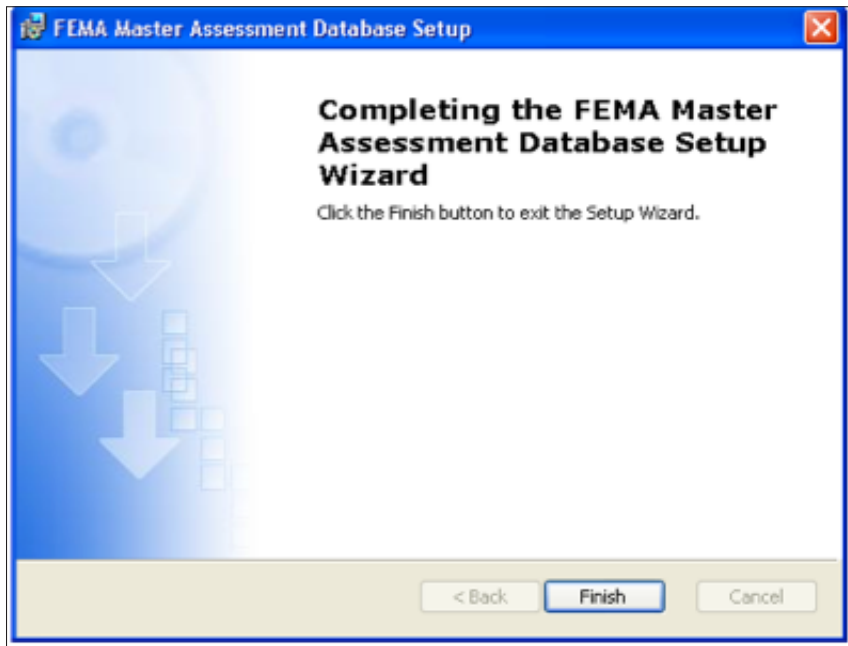
**NOTE THESE ARE PLACE HOLDER PICTURES**

## Installation Completion

A standard screen to ensure you are ready to install will appear. Proceed by left clicking **Install**.

Depending on the configuration of your system, the Install Wizard may take a long time looking for it and display a searching flashlight. It should eventually find it and get to this screen. The final standard screen indicates the Install Wizard has completed the installation. Left click **Finish** to end the installation.

**NOTE THESE ARE PLACE HOLDER PICTURES**



Following the same procedure, install a additional copy of the program for use on the computer(s) that your IRVS screeners will use to collect data, such as a laptop.



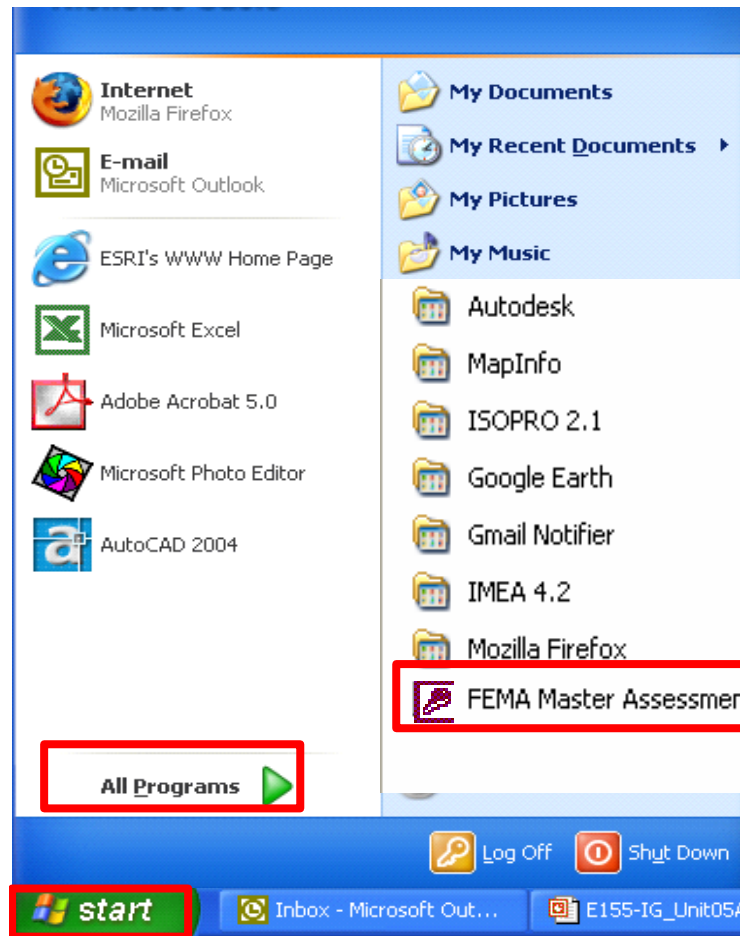
## Section 2: Open and Start the IRVS Process

- Open and Login to the IRVS Database
- IRVS Database Main Menu
- Help Function

### Open and Logon to the IRVS Database

To open the IRVS Database, you first left click on **Start**, then **Programs**, and look for the **IRVS Database** to left click. The IRVS Database should be at the end of the Startup Program Menu immediately after the installation. You can copy the shortcut icon for the IRVS Database to another location at any time.

**Note: the database can only be opened by left clicking on the IRVS Database Icon.**



**NOTE THESE ARE PLACE HOLDER PICTURES**

## Logon to the Database

The first action to enter the database is to logon with a user name and password. You can enter a newly installed IRVS database with the user names of: **Assessor**, **Editor**, **Reader** or **Administrator**. It is recommended to open the database the first time using the **Administrator** logon name which provides access to all functions of the program. The initial password for the **Administrator** user name is "Administrator". (Do not include the quotation marks, i.e. " ", in the user name or password.) By logging in with the **Administrator** user name, you will be able to establish new user accounts and passwords. (Explained further in, Section 8: Administrative Functions, of this manual.) If new user names and passwords have already been assigned, use your assigned user name and password to enter the database.

The database is preloaded with the following four user names and passwords:

- **Name:** Administrator      **Password:** Administrator
- **Name:** Assessor          **Password:** Assessor
- **Name:** Editor              **Password:** Editor
- **Name:** Reader              **Password:** Reader

NOTE THESE ARE  
PLACE HOLDER  
PICTURES

These passwords are examples only and should be changed after installing the program (you will learn how to do this later in this guide).

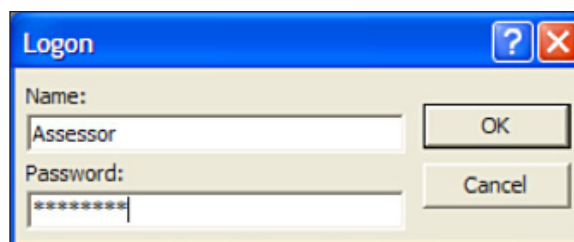
Enter your user name in the **Name** window and your password in the **Password** window, and then left click on **OK**.

This leads to a **Main Menu** of the database.

## IRVS Database Main Menu

The **Main Menu** of the database provides five options to the User:

- Conduct **IRVS Screenings** by left clicking on the **<Rapid Visual Screening>** button. This opens the IRVS module of the database. All screeners have access to this module.
- Perform **Administrative Functions** by clicking on the **<Administrative Functions>** button.



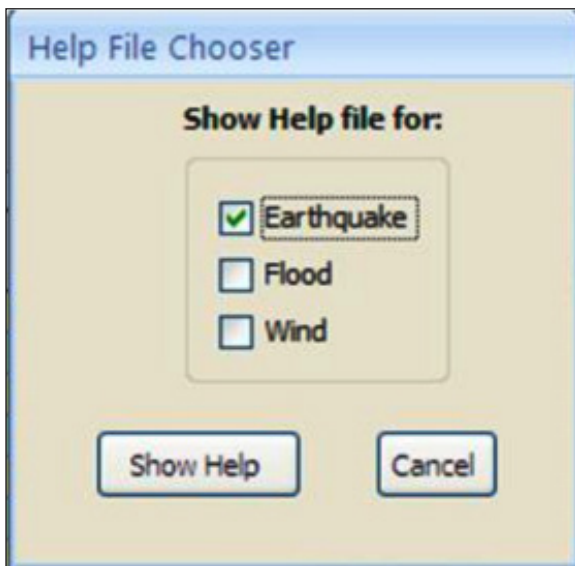
Note: administrative functions are not available to all users. Only those logged on with administrator permission can use the administrative functions. For example, only administrators may import screening records from the field database copy to the Master Database copy

- Change the **Password** of the user that is logged on by clicking on the <**Change Password**> button. All users have access to change their own password.
- Start the basic IRVS module by left clicking on <**Rapid Visual Screening**> button.

### Help Function

On all forms in the database, the user guide or a specific catalog reference can be opened by first left clicking on an area or question in a form, and then selecting the F-1 key on the user's key board.

**Current Question Help:** The user guide or a specific catalog reference can be also be opened by left clicking the <**Current Question Help** [F1]> button on the bottom of many forms.



**Natural Hazard Help:** A specific catalog reference can be also be opened by left clicking the <**Natural Hazard Help**> button on the bottom of the two Site Scoring forms. This opens up a separate window and enables the user to display special help files for the topics of: Earthquake, Flood, and Wind.



## Section 3: Create and Display an IRVS Record



- IRVS Record Listing
- Create a new IRVS Record
- Plot/Display IRVS Site Coordinates
- Facility Screening Folders

### IRVS Record Listing

Selecting the <**Rapid Visual Screening**> button from the Main Menu will bring you to the **IRVS Record Listing** form. This displays a list of the current screening records in the database. The first time you enter the database (with no prior screenings entered), this list will be blank. From this form you can either add a new IRVS record or review/edit a record previously entered screening.

The screenshot shows the 'IRVS Record Listing' form. It features a table with columns: Facility Name, Facility ID#, Screening No. / Date, Screening Comments, City, State, Site Type, Sector, Subsector, Facility Importance, and Summary Computed. A search bar with 'Search' and 'Clear' buttons is located above the table. Below the table is a grid of buttons for various actions: 'Add New Site', 'Site ID, Address, Coordinates', 'Pre-field Questions', 'Site Evaluation', 'Site Summary', 'Exec Sum/POC/Photos/GIS', 'Help', 'View All Summaries (Filtered List)', 'Plot (Filtered List)', 'Print Question Details (Filtered List)', 'Print Question Details (Selected Assessment)', 'Print All Details (Selected Assessment)', 'Print Risk Summary (Selected Assessment)', and 'Close'. The 'Close' button is highlighted with a red border. Numbered callouts 1 through 4 point to specific areas: 1 points to the search bar, 2 points to the table, 3 points to the 'Add New Site' button, and 4 points to the 'View All Summaries' button.

There are four areas on this form:

- The top section of the form (marked with a ① in the diagram) enables the user to sort the list of records. Enter a search term or use the drop down boxes under one or more columns to create a query. Then left click the <**Search**> button to filter the records and display a list of only those records that match the query. Left click the <**Clear**> button to clear the query and display all records in the database.
- The second section of the form (marked with a ② in the diagram) enables the user to select a single record to display or edit. First select one of the records in the list by left clicking on the far left column. This will mark the screening record desired with a right pointing arrow head if one is not already there. This selects the screening record and links the buttons on the form to that screening.

- The third section of the form (marked with a 3 in the diagram) enables the user to create a new IRVS record for screening, to conduct an evaluation of the selected record, to display the Risk Summary of the selected record, and to enter/edit additional information, photos, and files of the selected record.
- The bottom section of the form (marked with a 4 in the diagram) enables the user to display, plot, and print screening details for multiple screening records.


## Create an IRVS Record

The first task for using the database is to create a new IRVS record. This establishes a record in the database and stores the basic information about the site to be screened including: screening date, site name, site unique ID number, address, sector and subsector identification, site importance, and geographical coordinates.

To create a new IRVS record:

- Left click on the <Add New Site> button in the lower left corner. The software will immediately go to the <IRVS Site Record> screen.

**iRVS Site Record**

Facility Name \*:  Default Facility Image:  

Facility ID #:  Facility Descriptive Text:

Org. Name:

Address1:

Address2:

City:  St:

Zip:  Sector:  Facility Importance:

Site Type\*:  Subsector:

Assessment(s) Coordinates

Assessment Folder Name:

Assessment Number	Assessment Date *	Assessment Comments / Notes	Assessment Folder Name	Enter By

Create additional (blank) assessment record for this site

Record:

Required Field(s) For Help, Press the F1 Key

On this screen, information about the screening site is recorded. This information is used to produce IRVS reports and for filtering during queries. Note the three asterisked (\*) entries: **Facility Name**, **Site Type**, and **Screening Date**. These three fields are the minimum required entries to create an IRVS record. The other fields are optional.

- **Name and Address:** The name and address fields are simple text entry boxes. Note you may select the state from a drop down menu, or type in the two letter abbreviation.
- **Facility Descriptive Text:** simple text entry box.
- **Sector and Subsector:** The Sector and Subsector fields are drop down entries. Select the Sector entry first. The Subsector choices are populated from the Sector selection.
- **Facility Importance:** The Facility Importance field is a simple drop down list with three choices: High, medium, Low. There are no predefined criteria for these rankings. This field is simply provided as an additional means for a organization to filter and query screening records.
- **Default Facility Image:** The Default Facility Image is a drop down box listing of pictures loaded into the database for this screening site. Select one picture and it will display on the form when the record is opened.
- **Site Type:** The Site Type field is a drop down list with three choices: Buildings, Mass Transit Systems, and Tunnels.

The “**Site Type**” field may need some further clarification. The RVS tool provides tailored question sets and risk calculations for different types of infrastructure. Currently, the IRVS tool supports three different types of infrastructures: Buildings, Mass Transit Systems, and Tunnels. For each record the user must identify the type of infrastructure to be screened by selecting from the drop down box “Building”, “Mass Transit Station”, or “Tunnel”.

Currently, the IRVS tool supports three different types of infrastructures: Buildings, Mass Transit Systems, and Tunnels.

After selecting a **Site Type**, the software enables the two Tabs on the form: **Screening Records** and **Coordinates**.

- The **Screening Records Tab** enables the user to either create a new blank record (with no previously entered evaluation data) for this site or to create a duplicate of an existing IRVS record (with evaluation data) for use in analysis or “What if” investigation.
- The **Coordinates Tab** enables the user to record coordinates around the screening site and plot them on the users mapping program.

IRVS Site Record

Facility Name \*: **Test 2** Default Facility Image: **bldg1.jpg**

Facility ID #: **Test 2** Facility Descriptive Text:

Org. Name: **HIC**

Address1: **1111**

Address2: **1111**

City: **Springfield** St: **VA**

Zip: **11111** Sector: **Healthcare and Public Health** Facility Importance: **Primary**

**Site Type\*: Building** Subsector: **Direct Patient Healthcare**

Assessment(s) Coordinates

Assessment Folder Name: **C:\IRVSV1\Test 2\Assessment\_01\_2011-03-10\**

Assessment Number	Assessment Date *	Assessment Comments / Notes	Assessment Folder Name	Enter By
01	3/10/2011	Primary site	Assessment_01_2011-03-10\	assessc

Create additional (blank) assessment record for this site

Create a duplicate of Assessment [01] including scoring

Record: 1 of 1 No Filter Search

\* Required Field(s) For Help, Press the F1 Key Close

## Plot/Display IRVS Site Coordinates

The **Coordinates Tab** enables the user to record coordinates of the screening site and plot them on the users mapping program. This visualization tool not only enhances the screening evaluation collection process, but also supports the risk analysis process and post IRVS mitigation planning. (Note: the user must have an installed imagery program compatible with reading KML files, such as Google Earth®, on their system to use the Coordinates function.

IRVS Site Record

Facility Name \*: **Test 2** Default Facility Image: **bldg1.jpg**

Facility ID #: **Test 2** Facility Descriptive Text:

Org. Name: **HIC**

Address1: **1111**

Address2: **1111**

City: **Springfield** St: **VA**

Zip: **11111** Sector: **Healthcare and Public Health** Facility Importance: **Primary**

Site Type\*: **Building** Subsector: **Direct Patient Healthcare**

Assessment(s) **Coordinates**

\* Enter coordinates in either **DD-MM-SS.##-x** format or in: **Decimal Degrees ###.####**

Point Number	Lat DD-MM-SS.##-N	Long DDD-MM-SS.##-W	Lat Dec. Deg	Long Dec. Deg	Comment
1	38:55:42.79-N	077:00:40.18-W	38.92855	-77.01116	West side

Add coordinates for this site Plot These Lat/Long Help

Record: 1 of 1 No Filter Search

\* Required Field(s) For Help, Press the F1 Key Close

To create a plot point, enter the point's Latitude and Longitude values on the **Coordinates Tab**. Multiple plot points can be added by simply left clicking the **<Add Coordinates for this site>** button. The database automatically assigns a point number to each plot.

Note: You can enter coordinates in either in Degrees Minutes Seconds format or in Decimal Degree format; however values in Decimal Degree format are used to create the KML file for display in Google Earth® or other visualization program.

If you have coordinates in Degrees Minutes Seconds format, enter them in the first two boxes, and the Decimal Degree equivalents will be calculated for you in the second two boxes.

Alternatively, you can enter the Decimal Degree values directly in the second two boxes. If you choose to do this, then any values that might have already be in the corresponding Degrees Minutes Seconds fields will be removed, leaving only the Decimal Degree values you supplied.

Left clicking the **<Plot These>** button generates a KML file and automatically opens the file for visualization of the screening site.

- The process plots the entered coordinates and displays a 100 ft., 300 ft., and 1,000 ft. ring around the plotted points
- The process also displays the following IRVS screening information about the site:

Name: \_\_\_\_\_

Site Type: \_\_\_\_\_

Sector: \_\_\_\_\_

IRVS Date: \_\_\_\_\_

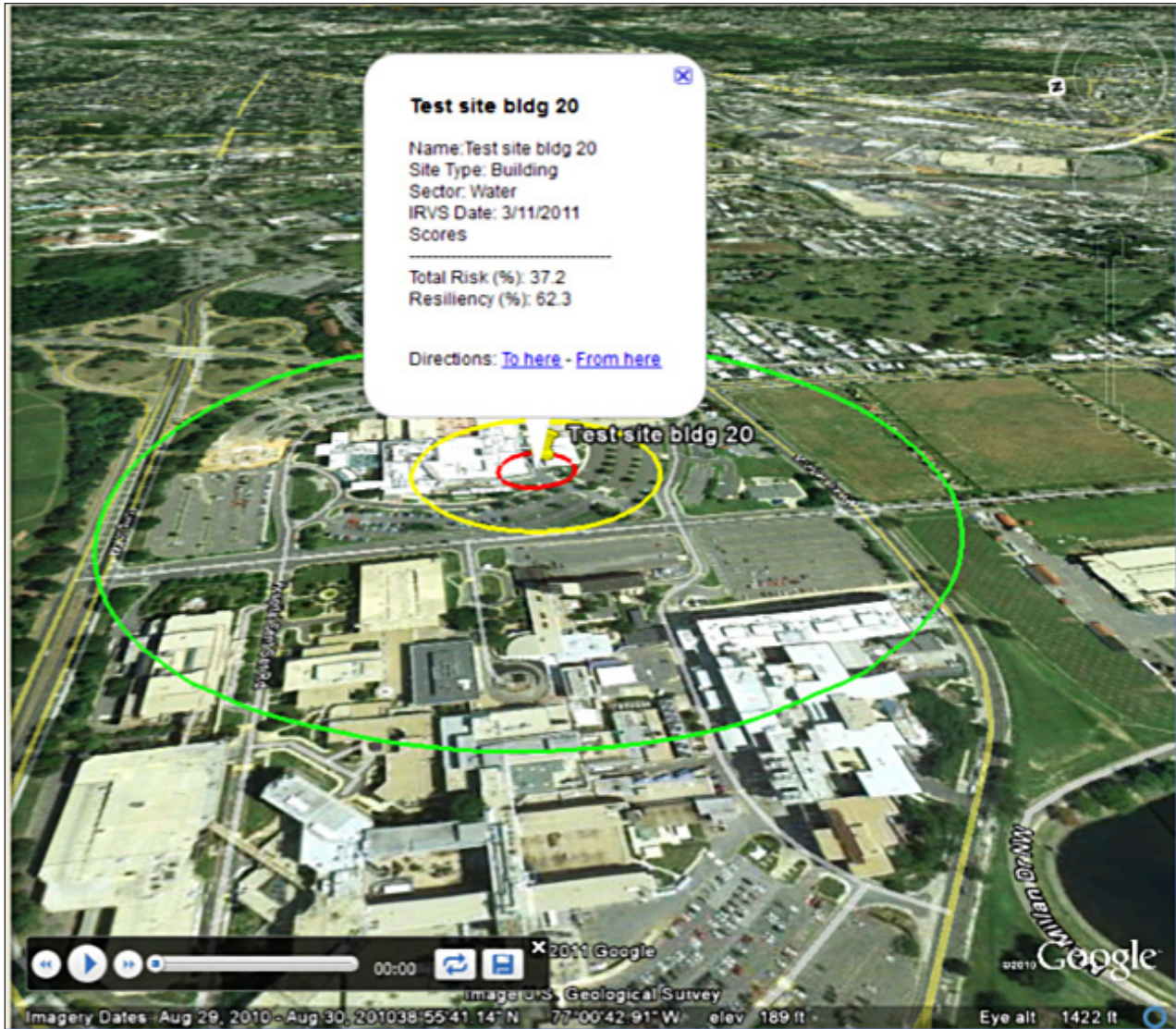
Scores \_\_\_\_\_

\_\_\_\_\_

Total Risk (%): \_\_\_\_\_

Resiliency (%): \_\_\_\_\_



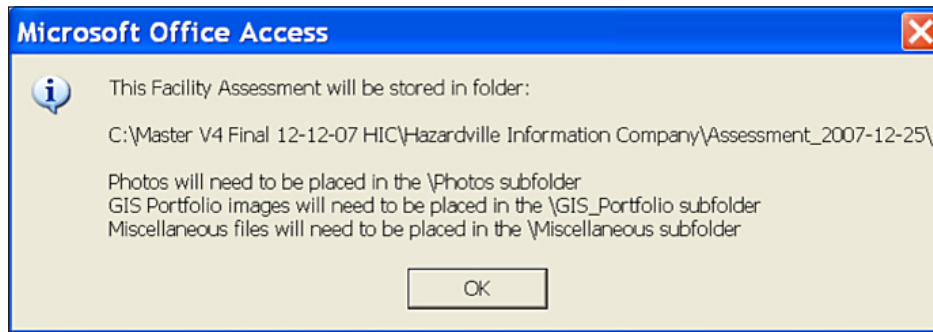


## Facility Screening Folders

When you create the new IRVS record, the software automatically creates three subfolders named GIS Portfolio, Miscellaneous Files, and Photos, all under a main folder that uses the IRVS Site location and screening date as the main folder name.

The record's folder name is automatically displayed in the field "**Screening Folder Name**". The program will also display a reminder notice of the folder location when you create the screening record. After taking notice of folder names, left click **OK** to finish creating the record.





**Note:** If you changed the program's location using Custom Installation, then you should make note of the file path that these subfolders are placed in, as you will need that information to properly load and link the contents of these subfolders to other databases.



## Section 4: Conduct an IRVS Screening

- Using the IRVS Data Forms
- Conduct Pre-Field Data Entry
- Conduct an On Site Evaluation
- Calculate and Review the Risk and Resiliency Summary Screen

After you have created an IRVS site record, you are ready to start the IRVS screening process. First select one of the screening records by left clicking on the far left column of the **IRVS Record Listing** form. This will mark the screening record desired with a right pointing arrow head if one is not already there. This selects the screening record and links the buttons on the form to that screening record.

### Using the IRVS Data Forms

The tabs on the Pre-Field and Site Evaluation forms function in a similar manner. There is a list of question fields on the left side of the form followed by a response field drop down list. Each question also has a Clear Choice “X” button, and a “Red Flag”, “Unknown” and “Comment” entry box.

IRVS Site Scoring

RVS Building/Facility:  Organization:

Site Type:

Assessment Date:

Hazards Pre-Field Questions Structure Type

Question	Clear Choice	Choice	Red Flag	Unk	Comments
▶ Hazard: Blast	<input checked="" type="checkbox"/>	▼ Blast	<input type="checkbox"/>	<input type="checkbox"/>	
Hazard: CBR	<input checked="" type="checkbox"/>	▼ CBR	<input type="checkbox"/>	<input type="checkbox"/>	
Hazard: Seismic	<input checked="" type="checkbox"/>	▼ Seismic	<input type="checkbox"/>	<input type="checkbox"/>	
Hazard: Flood	<input checked="" type="checkbox"/>	▼ Flood	<input type="checkbox"/>	<input type="checkbox"/>	
Hazard: Wind	<input checked="" type="checkbox"/>	▼ Wind	<input type="checkbox"/>	<input type="checkbox"/>	
Hazard: Fire	<input checked="" type="checkbox"/>	▼ Fire	<input type="checkbox"/>	<input type="checkbox"/>	
Resiliency Computations (Required Question)	<input checked="" type="checkbox"/>	▼ Medical	<input type="checkbox"/>	<input type="checkbox"/>	

Record: 1 of 7 No Filter Search

View Summary Print Question Details Print Risk and Resiliency Summary Natural Hazard Help Current Question Help (F1) Close

- The first column is a series of questions.
- To the right of each question, under a column titled “**Choice**”, is a drop down list of possible answers. Make your selection by left clicking on your answer.
- To the right of the Question field is a button with an “**X**”. By left clicking on this button, the previously entered choice for that single row will be cleared allowing the assessor to select a new response. Note that this action does not remove the marking in the red flag or unknown box, nor a comment. This must be accomplished separately.
- The box under the column “**Red Flag**” should be marked when the screener determines the circumstances surrounding the response to a question may be a concern requiring immediate attention.
  1. Left click in the box to mark the question with a red flag.
  2. A red flag generates a mandatory comment field to support the screener’s decision. Left click on **OK** to enter the comment.
  3. Enter your comments in the box, and then left click on Save.
  4. To remove a red flag, left click on the red flag.
- The box under the column “**Unknown**” is marked if the screener does not know the answer at the time of the screening. This can be changed at a later time when the proper response is learned. To remove a check mark in the “**Unknown**” box, left click on the check mark.
- The box under the column “**Comment**” is marked at any time to support or explain a unique or extraordinary circumstance. A comment is mandatory when the “**Red Flag**” box is marked.
  1. To add a comment, left click in the “**Comment**” box.
  2. Enter your comments in the box, and then left click on **Save**.
  3. To remove a comment, left click on the “**Comment**” box.
  4. Delete the comment and left click the **Save** button.
  5. The box will no longer be marked. Edit the comment in the same manner but the box will remain marked.

Across the bottom of the Pre-Field and Site Evaluation forms are Six buttons used to view and print IRVS data and also to view Help screens.

- **View Summary:** The <View Summary> button displays the Risk and Resiliency Summary form.
- **Print Question Details:** The <Print Question Details> button opens to a print view screen and displays a report consisting of the IRVS questions and answers. Note this view does not include the Risk and

Resiliency Summary screen or the other details of the screening (such as POC listing, Screening Team members, executive summary).

- **Print Risk and Resiliency Summary:** The **<Print Risk and Resiliency Summary>** button opens a Print Per-view screen of the Risk and Resiliency Summary.
- **Natural Hazard Help:** A specific catalog reference can be also be opened by left clicking the **<Natural Hazard Help>** button on the bottom of the two Site Scoring forms. This opens up a separate window and enables the user to display special help files for the topics of: Earthquake, Flood, and Wind.
- **Current Question Help:** The user guide or a specific catalog reference can be opened by first left clicking on an area or question in a form, and then left clicking the **<Current Question Help [F1]>** button.
- **Close:** The **<Close>** button returns the user to the previous menu.

## Conduct Pre-Field Data Entry

Pre-field data is the information that should be gathered before the onsite field screening is conducted. It is important to emphasize that screeners should make the effort to complete, as much as possible, the information required in the pre-field data in order to obtain accurate scorings.

The information gathered in the pre-field screening is intended to document basic identification and target density (described in the following section) information.

The pre-field data may be directly obtained from the screeners existing knowledge of the asset or through various private or public sources on the Internet.

Left click on the **<Pre-field Questions>** button to review or edit information. The software will immediately go to the Pre-field Scoring Form. Note the Pre-field form is tailored to the Site Type previously designated: Buildings, Mass Transit, or Tunnels.

- For Mass Transit and Tunnels, the Pre-Field form displays only one Tab: Per-Field Questions
- For Buildings, the Pre-Field form displays three Tabs: Hazards, Pre-Field Questions, and Structure Type.

## Hazard Tab (Building Screening Only)

The **Hazards Tab** enables the screener to tailor the Building screening process. The Screener designates of Hazards to include in the process and if Resiliency Computations are also to be included in the process.

The first five questions are a list of hazards:

- Blast
- CBR
- Seismic
- Flood
- Wind

Choose to include or not to include each of these Hazards.

The sixth hazard listed, “Hazard: Fire” is also used to tailor the IRVS screening. There are three choices for this hazard:

- **Short fire vulnerabilities checklist:** Fire Tab 1 will be displayed if this is selected. It has a small set of questions related to the hazard of fire will be included in the screening.
- **Fire marshals list - Longer list - includes all short list attributes:** Fire Tab 2 will be displayed if this is selected. This is a larger detailed set of fire related questions. If the screener wants to expand the basic question set and answer a larger detailed set of fire related questions, they may indicate that choice by selecting this option.
- **Blank space:** Chose this selection if you do not want to include the hazard “Fire” in the screening.

The IRVS screening is adjusted based on which Hazards are selected. At the completion of this form, the database automatically tailors the IRVS question set and grays out un-needed questions. Only those hazards selected are included in the risk analysis.

The final question listed on this form, “Resiliency Computations (Required Question)” is also used to tailor the IRVS screening. The answers provided in the drop screen are as follows

- **No resiliency computations are needed:** if this answer is selected, the resiliency sections of the IRVS methodology will be omitted from the screening. No resiliency related Tab will appear during the site evaluation scoring.

- **General:** if this answer is selected, the resiliency sections will be tailored to screen general facilities such as: commercial, agricultural, educational, and industrial. A “Continuity – General” Tab will appear during the site evaluation scoring.
- **Government:** if this answer is selected, the resiliency sections will be tailored to screen government facilities such as: offices, police stations, fire stations, and emergency operations centers. A “Continuity – Government” Tab will appear during the site evaluation scoring.
- **Medical:** if this answer is selected, the resiliency sections will be tailored to screen medical facilities. A “Continuity – Medical” Tab will appear during the site evaluation scoring.
- **Schools (K-12):** if this answer is selected, the resiliency sections will be tailored to screen school facilities. A “Continuity – School (K-12)” Tab will appear during the site evaluation scoring.
- **Business/Financial:** if this answer is selected, the resiliency sections will be tailored to screen/Business/Financial facilities. A “Continuity – Finance/Business” Tab will appear during the site evaluation scoring.
- **Retail:** if this answer is selected, the resiliency sections will be tailored to screen retail facilities. A “Continuity – Retail” Tab will appear during the site evaluation scoring.

## Pre-Field Questions Tab

The Pre-Field Questions Tab displays a tailored list of questions that starts the IRVS screening process. The questions displayed are adjusted based on the type of infrastructure (Tunnel, Building, or Mass Transit) and the hazards selected (Blast, CBR, Seismic, Flood, Wind, and /or Fire). Those questions that are not needed are grayed-out and not included in the risk analysis.

## Structure Type Tab (Building Screening Only)

The Structure Type Tab is only displayed when screening a building. The one question displayed on this Tab, “Building Type” is a critical question for the IRVS methodology. The screener should refer to the Building catalog when trying to determine the building type. The catalog can be opened by first opening the Structure Type Tab and then selecting the F-1 key on the user’s key board. The catalog can be also be opened by left clicking the <**Current Question Help** [F1]> button on the bottom of the form.



## Conduct on Site Evaluation

After you have completed Pre-field data entries, you are ready to record the IRVS on site screening data. First select one of the screening records by left clicking on the far left column of the IRVS Record Listing form. This will mark the screening record desired with a right pointing arrow head if one is not already there. This selects the screening record and links the buttons on the form to that screening record. Next left click the <Site Evaluation> button to open the IRVS Site Scoring Form.

The IRVS Site Scoring form is used to record answers to a series of screening questions on 11 to 14 Tabs. The question set and number of Tabs displayed are adjusted based on the users previous selections: the type of infrastructure (Tunnel, Building, or Mass Transit); the hazards selected (Blast, CBR, Seismic, Flood, Wind, and/or Fire); and Resiliency selection (No Resiliency computations, Governmental, General, Medical). Questions that are not needed are grayed-out and not included in the risk analysis.

The Questions and tabs on the IRVS Site Scoring forms are set up in a similar manner to the Pre-Field form. There is a list of question fields on the left side of the form followed by a response field drop down list. Each question also has a Clear Choice “X” button, and a “Red Flag”, “Unknown” and “Comment” entry box.

IRVS Site Scoring

RVS Building/Facility: **Test 2** Organization: **HIC**

Site Type: **Building**

Assessment Date: **3/10/2011**

Consequences Threat Site **Architectural** Building Envelope Structural MEP Fire -1 Fire -2 Security Cyber Continuity - Medical Operational Security

Question	Clear Choice	Choice	Red Flag	Unk	Comments
4.1 Building Height	X	>1000 ft (>80 ft) >100000 sf			
4.2 Building Configuration	X	Circular / Convex			
4.3 Overhang (ft)	X	> 15			
4.4 Lobby/Retail Location (in relation to main building footprint)	X	Detached			
4.5 Loading Dock / Mail Screening Location	X	Under Building			
4.6 Vehicular Penetration of Exterior Envelope	X	No			
4.7 Garage Location	X	Below Occupied Space, below ground			
4.8 Partitions	X	Braced			
4.9 Appendages (Chimneys, parapets, ornament, etc)	X	Not Braced			
4.10 Anchoring of non-structural components (suspended ceilings, furniture, plaster, etc.)	X	Less than 30%			
4.11 Horizontal (torsional) irregularity (stiffness and or mass)	X	None			
4.12 Vertical irregularity (stiffness and or mass)	X	Yes			
4.13 Soft Story	X	Yes			
4.14 Elevated tanks, bins, vessels, trussed towers especially on roofs	X	Several			

Record: 1 of 14 No Filter Search

View Summary Print Question Details Print Risk and Resiliency Summary Natural Hazard Help Current Question Help (F1) Close

## Threat Tab: Target Density Zones

The Threat Tab contains a special Help button labeled <**Target Density Worksheet**> at the top of the question list. The Help file is specific to three questions on the Tab

- Question 2.4.1 Target Density Zone I ( <100ft )
- Question 2.4.2 Target Density Zone II ( 100-300ft )
- Question 2.4.3 Target Density Zone III ( 300-1,000ft )

Responses to these three questions can either be entered from the drop-down menu of each question or the assessor can use the Target Density Zone Worksheet to answer the questions.

Left click on the <Target Density Worksheet> button at the top of the question list and a table labeled “Target Density” will pop-up. The assessor can use the worksheet to calculate the proper selections for questions 2.4.1, 2.4.2, and 2.4.3 enter the exact number of facilities for each category and zone into the table. After completing the table, left click the <Use> button to automatically populate the answers to the three questions.

iRVS Site Scoring

RVS Building/Facility: **Test 44** Organization:

Site Type: **Building**

Assessment Date: **3/31/2011**

Consequences Threat Site Architectural Building Envelope Structural MEP Fire

Question **Target Density Worksheet**

2.2 Site Population Density

2.3 Visibility / Symbolic

2.4.1 Target Density: Zone I (<100 ft) (See Target Density Worksheet at Top)

2.4.2 Target Density: Zone II (100-300 ft) (See Target Density Worksheet at Top)

2.4.3 Target Density: Zone III (300 - 1000 ft) (See Target Density Worksheet at Top)

2.5 Overall Site Accessibility

View Summary Print Question Details Print Risk and Resiliency

**2.5. Target Density**

You can use this worksheet to calculate the proper selections for questions 2.4.1, 2.4.2, and 2.4.3.

Facility Type	Question 2.4.1 Zone I < 100 feet	Question 2.4.2 Zone II 100 - 300 feet	Question 2.4.3 Zone III 301 - 1000 feet
Agriculture and Food			
Banking and Finance			
Chemical and Hazardous Materials			
Defense Industrial Base			
Energy			
Emergency Services			
Information Technology			
Telecommunications			
Postal and Shipping			
Healthcare and Public Health			
Transportation			
Water			
National Monuments and Icons			
Commercial Facilities			
Government Facilities			
Dams			
Nuclear Facilities			

Totals:

Clear Cancel Use

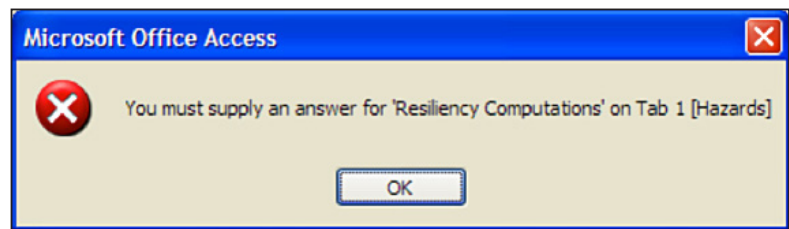
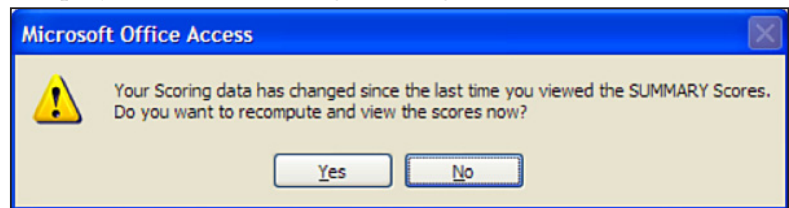
Record: 1 of 17 No Filter Search

Close

## Calculate and Review the Risk and Resiliency Summary Screen

After completing the Pre-Field and Site Evaluation data entry, use the <**View Summary**> button on the IRVS Site Scoring form or the <**Site Summary**> button on the IRVS Record Listing form to display the Risk and Resiliency Summary Screen. This starts several automated process reviews and risk assessment calculations.

- **Check if Recompilation is Required:** The system first checks if any scoring data has changed since the last time you viewed the Summary Scores. If there has been no change, the system does not need to recompute the data and will simply display the existing **Risk and Resiliency Site Summary**. If scoring data has changed (an answer to a question was added or changed), the system will display the below message stating the **Risk and Resiliency Site Summary** needs to be recomputed. If this happens, left click <**Yes**> to recompute and view the Risk and Resiliency Site Summary.
- **Check for Required Entries:** The system next checks to ensure all required entries were entered into the forms. If a required entry is missing, the system will not calculate the **Risk and Resiliency Site Summary** and prompt you to provide the missing answers. For example, if the user does not answer the **Resiliency Computation** question on the Hazards Tab, the system will display the following error message. If this happens, Left click <**OK**> to return to the database and enter the missing data.
- **Check if MS Excel® is Running:** The program next checks if the MS Excel® is currently an open program on your computer. This is done because the database uses MS Excel® to calculate the **Risk and Resiliency Site Summary**. If MS Excel® is an open program, then the system will not calculate the Risk and Resiliency Site Summary and prompt you to close MS Excel®.
- **Calculate Risk and Resiliency Site Summary:** If all required answers are present and MS Excel® is not running, the system will compute the **Risk and Resiliency Site Summary** and display the below message. Note depending on the capability of your computer system, this could take a few moments. After calculations are completed, the system will display the **Risk and Resiliency Site Summary**.



Risk and Resiliency Summary														
RVS Building/Facility: <b>Building 21</b>					<b>Scales</b> <b>Scores and Color Mapping</b> <b>Risk Color Scale</b> 0-30    30-50    50-70    70-100 <b>Resiliency Color Scale</b> 100-70    70-50    50-30    30-0									
Facility ID#: <b>5</b>		Assessment Date: <b>3/11/2011</b>			Site Type: <b>Building</b>									
Summary Categories	Internal Intrusion	Internal Explosive	Internal CBR	Explosive Zone 1	Explosive Zone 2	Explosive Zone 3	CBR Zone 1	CBR Zone 2	CBR Zone 3					
Total Consequences (scale of 100)	38.3	41.0	45.6	37.5	38.2	37.3	39.3	39.9	38.3					
Total Threat (scale of 100)	85.2	52.1	53.6	32.9	22.3	37.4	18.3	24.0	35.5					
Total Vulnerabilities (scale of 100)	29.0	56.8	55.3	44.2	50.0	56.7	7.6	11.1	17.1					
Total Risk (scale of 100)	34.2	44.4	48.8	34.9	28.6	37.5	15.5	18.7	24.1					
Summary Categories	Earthquake General Shaking	Earthquake Ground Failure	Flood Stillwater	Flood Velocity Surge	Wind Hurricane	Wind Tornado	Wind Other	Landslide Rainfall	Fire From Earthquake	Fire From Blast	Fire From Arson			
Total Consequences (scale of 100)	19.6	19.9	19.3	19.3	32.1	28.1	39.8	18.7	0.0	36.0	38.3			
Total Threat (scale of 100)	5.9	10.8	2.4	3.1	37.8	34.5	38.0	23.8	0.8	48.7	62.7			
Total Vulnerabilities (scale of 100)	58.8	49.2	10.6	12.6	49.7	57.9	53.5	18.9	8.4	8.9	6.5			
Total Risk (scale of 100)	16.2	18.5	8.4	9.3	34.4	31.4	38.8	19.7	0.0	20.2	19.9			
Resiliency Scales (1-100)						Total Score Summary All Scores based on (1-100)								
Performance Measure	Time Measure	Robustness Measure	Resourcefulness Measure	Recovery Measure		Intrusion:	Blast (Interior):	CBR (Interior):	Blast (Exterior):	CBR (Exterior):	Seismic:	Flood:	Wind:	Fire:
81.3	82.6	56.3	86.8	87.2		34.2	44.4	48.8	35.2	21.8	17.6	9.0	36.0	19.3
Multihazards Interaction Matrix						Resiliency: <b>67.2</b>								
... will result in this change for other hazards:						Total Risk All Scenarios: <b>42.6</b>								
a change in:	Blast	CBR	Seismic	Flood	Wind	Fire								
a change in Blast	100.0%	16.5%	53.3%	8.8%	48.2%	9.8%								
a change in CBR	10.1%	100.0%	0.0%	0.9%	0.0%	0.0%								
a change in Seismic	25.8%	0.0%	100.0%	26.2%	49.4%	3.7%								
a change in Flood	5.7%	1.0%	35.4%	100.0%	14.1%	7.0%								
a change in Wind	27.3%	0.0%	57.8%	12.2%	100.0%	3.9%								
a change in Fire	7.1%	0.0%	5.5%	7.8%	5.1%	100.0%								
Print						Close								

## Section 5: Finish the IRVS Process



- Add Executive Summary
- Attach Photos, Miscellaneous Files, and Contacts to IRVS Records
- Export IRVS Records to Transfer Media
- Erase Screening Record from Field Team Database

During the process, screeners often develop points of contact and collect receive digital files such as drawings, schematics, blueprints, operating procedures, emergency plans, photos of the facility, etc., to assist with their analysis. This optional information as well as an Executive Summary may be added to the database as it provides a baseline for the screening and supports the screener's decisions.

The optional activities available in the database tool include:

- Adding an Executive Summary
- Attaching Photos, Miscellaneous Files, and Contacts to the screening record
- Exporting IRVS records to transfer media
- Erasing Screening Record from the Field Team's database

First select one of the screening records by left clicking on the far left column of the **IRVS Record Listing** form. This will mark the screening record desired with a right pointing arrow head if one is not already there. This selects the screening record and links the buttons on the form to that screening record. Next left click the **<Exec Sum/POC/Photos/GIS>** button to open the **Executive Summary/POC/Photos/GIS/Files** form.

Facility Name	Facility ID#	Assessment Number / Date	Assessment Comments	City	State	Site Type	Sector	Subsector
Test site bldg 20	5	02 3/11/2011	Changed Resiliency Order for	Stafford	MD	Building	Water	Treated Water Monito
Test site bldg 20	5	03 3/11/2011	Change Truck Threat Assess	Stafford	MD	Building	Water	Treated Water Monito
Building 21	5	01 3/11/2011	Resiliency	stafford	MD	Building	Agriculture and Food	Agricultural and Food I



## Add Executive Summary

**Executive Summary Tab:** The Executive Summary Tab of the IRVS database is an area for the screener to write a report on one particular screening record. Left clicking on the <**Executive Summary**> tab will take you to that form.

The Executive Summary form provides three fields to summarize general information about a specific screening record. When printed, these three fields appear as a single document with three main sections: **Introduction, Observations, Recommendations/Remediation.**

The **Introduction** field usually contains background information, facility location, mission, dates, etc. The **Observations** field might list general information about what was found and particular concerns. Finally, the **Recommendations/Remediations** field is for general recommendations about current conditions.

The screenshot displays the 'Assessment Main Page' interface. At the top, there are input fields for 'Facility Name' (Test site bldg 20), 'Facility ID #' (5), 'Site Type' (Building), and 'Assessment Date' (3/11/2011). A 'Default Image' dropdown menu is set to 'airintake1.jpg', with a corresponding image preview on the right. Below these fields is a horizontal tab bar with several options: 'Executive Summary', 'POC's', 'Assessment Team', 'Add Photos', 'View Photos', 'Add GIS Portfolio Images', 'View GIS Portfolio', and 'Miscellaneous Files'. The 'Executive Summary' tab is highlighted with a red circle. The main content area is divided into three columns: 'Introduction', 'Observations', and 'Recommendations / Remediations'. The 'Introduction' column contains text about a physical security assessment performed on 10-1 March 2011. The 'Observations' column describes two entrances off xxx St. and a loading dock. The 'Recommendations / Remediations' column lists actions like establishing separate Minimum-Points-of-Presence and hardening vehicle pipe gates. At the bottom right, there is a 'Close' button and a note 'For Help, Press the F1 Key'.

After loading information, you can left click on <**Close**> to go back to the **IRVS Record Listing** form or left click on a different tab, such as <**Points of Contact**> to directly jump to that function.



## Points of Contact

The **Points of Contact** tab takes the screener to the Points of Contact screen for keeping track of the people identified or met during the screening. The buttons across the bottom allow you to add or delete Points of Contact as needed. Add a POC by left clicking on **<Add New POC>**.

Assessment Main Page

Facility Name: Test site bldg 20 Default Image: airtake1.jpg

Facility ID#: 5

Site Type: Building

Assessment Date: 3/11/2011

Executive Summary **POC's** Assessor Team Add Photos View Photos Add GIS Portfolio Images View GIS Portfolio Miscellaneous Files

First Name	Last Name	Title	Organization	Address	City	State	Zip
Joyce	Smith	Ms.	HIC 4	35 West Ave	Eba	NY	14058
Terry	Ryan	Mr.	HIC 4	35 West Ave	Eba	NY	14058

Add New POC Delete POC: Terry Ryan Add New POC and Duplicate

Record: 2 of 2 No Filter Search

For Help, Press the F1 Key Close

This input screen is different than the Screening Team Members input screen, as you enter the information directly in each cell. You can enter the information and move to the next cell by using the **<Tab>** on the keyboard or by left clicking on the cell. Use the slide scale or keyboard arrows to move the screen to see the remaining information on the POC line.

You must press **<Enter>** or the **<Tab>** key after the cells are complete to add the information to the database.

There's even a feature in the POC list to duplicate the address from previous entries, since it is likely that many POCs will have the same business address. Just left click the left column to get the black arrow to appear on the entry with the address to be copied. Then by left clicking on the tab **<Add New POC and Duplicate>** the **Organization, Address, City, State, and Zip** blocks will be duplicated on the next entry line.

After loading information, you can left click on <Close> to go back to the **IRVS Record Listing** form or left click on a different tab, such as <**Screening Team**> to directly jump to that function.

## Screening Team

CHECK THIS SHOULD BE AN  
ARROW OR ARE WORDS  
MISSING?

Left clicking on the < displays a form used to track contact information of the screening team members. The buttons across the bottom allow you to add or delete team members as needed.

Assessment Main Page

Facility Name: Test site bldg 20      Default Image: bldg1.jpg

Facility ID#: 5

Site Type: Building

Assessment Date: 3/11/2011

Executive Summary   **Assessment Team**   Add Photos   View Photos   Add GIS Portfolio Images   View GIS Portfolio   Miscellaneous Files

Team Member	Title	Organization	Work Phone	Mobile Phone	Email
▶ Jones, Bill	Mr.	HIC	333 555.1234		13@www.com
Smith, Lora	Ms.	HIC	333 555.1235		14@www.com
Smith, Terry	Mr.	HIC	333 555.1236		15@www.com

Select Team Member from List   Add New Team Member   Delete Team Member: Jones, Bill

Record: 14   1 of 3   No Filter   Search

For Help, Press the F1 Key   Close

Left clicking on the <**Add New Team Member**> button takes the assessor to a fill-in-the-blank list. Fill in this screen with as much information as is available or desired.

After adding team member information, left click on the <**Add**> button. You are taken back to the **Screening Team** Tab and you can see the information that was entered. Use the slide scale or keyboard arrows to see the off-screen information. The other buttons allow you to select the Team Member from a List previously generated from other screenings or remove a Team Member from this screening record. Remember to first select one of the screening team members by left clicking on the far left column of the Team Members. This will mark the person desired with a right pointing arrow head if one is not already there.

After loading information, you can left click on **<Close>** to go back to the **IRVS Record Listing** form or left click on a different tab, such as **<Add Photos>** to directly jump to that function.

**Note:** After one or more photos are added to the screening record, one may be selected for display on the upper right corner of the form. Simply, left click on the **Default Image** drop down box, and select the name of the photo to display.

## Adding Photos

The **Add Photos**, **Add GIS Portfolio Images** and **Miscellaneous Files** work similarly to add these items to the database and files. A user can browse to a single file and copy it to the database and current screening folder or browse to a file and then copy all files in that folder to the database and current screening folder. A user can also delete files from the database and screening folder.

- First select the **<Add Photos>** Tab from the **Executive Summary/POC/Photos/GIS/Files** form.
- Next, select either **Copy only the selected image** to attach a single photo, or select **Copy All from the folder** to attach all files in the selected folder.
- Left click the **Browse for a file** button to browse and select a photo to attach.
- A standard browse function screen will open. Search for the file you want, then double click the file or single click the file and single click the Open button to select the file.
- The software confirms that the files were added and attached. Left click Yes to continue with each pop up. Left click **No** or **Cancel** to cancel the attachment.
- Left click OK to return to the **Executive Summary/ POC/ Photos/GIS/ Files** form.
- Left click the **View Photos** tab to ensure the selected photos were added.

**Note** that the database will recognize any type of file in the “Miscellaneous” folder. However, the database only recognize files with a “.jpg”, “.gif” or “.bmp” file extension in the “Photo” and “GIS Portfolio” folders.

A user can also manually add or delete files from the screening sub-folders. The database will automatically detect changes and update the current screening's folder when the "Add Photo", "View Photos", "Add GIS Portfolio Images", "View GIS Portfolio" or "Miscellaneous Files" tabs are opened.

### Setting the Default Image

After adding photos, the user has an option to select one of the photos as the "Default Image" that will appear on various screens in the top right corner. The image is generally one that represents the location of the screening. For instance, it could be a photo of the building or a sign depicting the name of the facility. Left click on the drop-down menu to the right of the Default Image field and select the desired default image. The image will be present each time the screening is accessed.

### Deleting a Photo

To delete a photo, first select the photo from the list by left clicking on the photo's name. This will place a black triangle next to the name of the photo selected.

Next left click on the **Delete Photo** button.

The software confirms the user wants to delete a file. Left click **Yes** to continue with the deletion. Left click **No** or **Cancel** to cancel the deletion.

### Viewing Photos

Left click on the **View Photos** tab in the center of the screen to display the photos. You can left click on a photo and enter Photo Zoom which gives a limited capability for viewing the photo in different sizes, using Zoom, Clip, and Internet Explorer. Clip is essentially what you currently see.

If there are more than five items attached to the database, left click the arrow buttons in the lower left corner, to display the additional items. When done, left click Close to exit.

### Adding GIS Images

The **Add GIS Portfolio Images**, **Add Photos** and **Miscellaneous Files** functions work similarly to add or delete these items from the database and files. A user can browse to a single file and copy it to the database and current screening folder or browse to a file and then copy all files in that folder to the database and current screening folder. A user can also delete files from the database and screening folder.

- First select the <Add GIS Portfolio Images> Tab from the **Executive Summary/POC/Photos/GIS/Files** form.
- Next, select either **Copy only the selected image** to attach a single GIS portfolio image, or select **Copy All from the folder** to attach all files in the selected folder.
- Left click the **Browse for a file** button to browse and select a GIS portfolio image to attach.
- A standard browse function screen will open. Search for the file you want, then double click the file or single click the file and single click the **Open** button to select the file.
- The software confirms that the files were added and attached. Left click **Yes** to continue with each pop up. Left click **No** or **Cancel** to cancel the attachment.
- Left click on **OK** to finish.
- Left click the View GIS Portfolio tab to ensure the selected photos were added.

Note that the database will recognize any type of file in the “Miscellaneous” folder. However, the database only recognize files with a “.jpg”, “.gif” or “.bmp” file extension in the “Photo” and “GIS Portfolio” folders.

A user can also manually add or delete files from the screening sub-folders. The database will automatically detect changes and update the current screening’s folder when the “Add Photo”, “View Photos”, “Add GIS Portfolio Images”, “View GIS Portfolio” or “Miscellaneous Files” tabs are opened.

## Deleting GIS Images

To delete a GIS portfolio image, first select the GIS portfolio image from the list by left clicking on the image’s name. This will place a black triangle next to the name of the image selected.

Next left click on the **Delete GIS Portfolio Image** button.

The software confirms the user wants to delete a file. Left click **Yes** to continue with the deletion. Left click **No** or **Cancel** to cancel the deletion.

## Viewing GIS Portfolio

Left click on the <**View GIS Portfolio**> tab in the center of the screen to display the GIS portfolio images. You can left click on an image and



enter Photo Zoom which gives a limited capability for viewing the image in different sizes, using Zoom, Clip, and Internet Explorer. Clip is essentially what you currently see.

If there are more than five items attached to the database, left click the arrow buttons in the lower left corner, to display the additional items. When done, left click **Close** to exit.

## Adding Miscellaneous Files

The Miscellaneous Files, Add Photos and Add GIS Portfolio Images functions work similarly to add or delete these items from the database and files. A user can browse to a single file and copy it to the database and current screening folder or browse to a file and then copy all files in that folder to the database and current screening folder. A user can also delete files from the database and screening folder.

1. First select <**Miscellaneous Files**> Tab from the **Executive Summary/POC/Photos/GIS/Files** form.
2. Next, select either **Copy only the selected image** to attach a single file, or select **Copy All from the folder** to attach all files in the selected folder.
3. Left click the **Browse for a file** button to browse and select a file to attach.
4. A standard browse function screen will open. Search for the file you want, then double click the file or single click the file and single click the **Open** button to select the file.
5. The software confirms that the files were added and attached. Left click **Yes** to continue with each pop up. Left click **No** or **Cancel** to cancel the attachment.
6. Left click on **OK** to finish.
7. Files can then be viewed by double clicking on the File Name.

Note that the database will recognize any type of file in the “Miscellaneous” folder. However, the database only recognize files with a “.jpg”, “.gif” or “.bmp” file extension in the “View Photo” and “View GIS Portfolio” folders.

A user can also manually add or delete files from the screening sub-folders. The database will automatically detect changes and update the current screening’s folder when the “Add Photo”, “View Photos”, “Add GIS Portfolio Images”, “View GIS Portfolio” or “Miscellaneous Files” tabs are opened.



## Deleting Miscellaneous Files

To delete a file, first select the file from the list by left clicking on the image's name. This will place a black triangle next to the name of the image selected.

Next left click on the **Delete file** button.

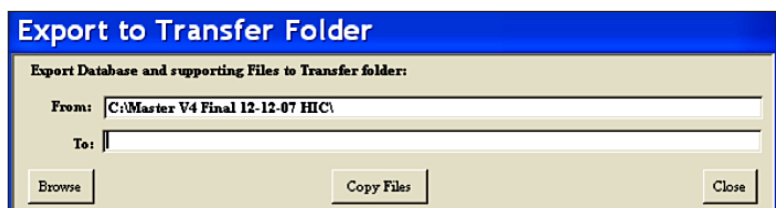
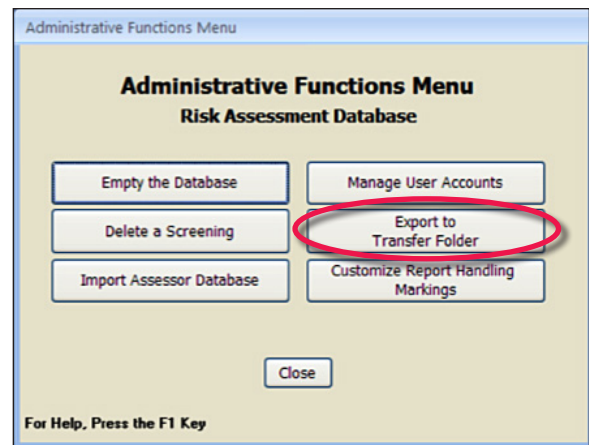
The software confirms the user wants to delete a file. Left click **Yes** to continue with the deletion. Left click **No** or **Cancel** to cancel the deletion.

## Export IRVS Records to Transfer Media

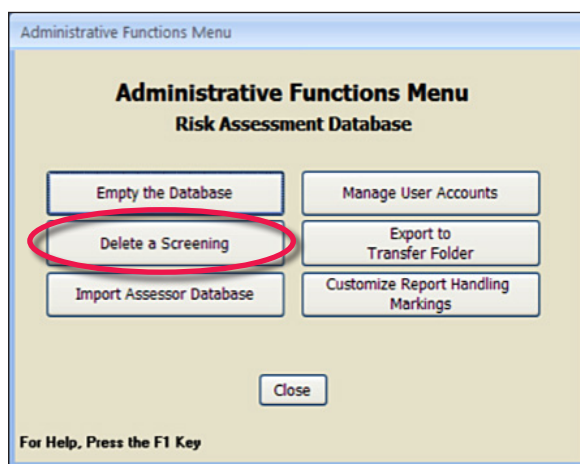
After completing an IRVS screening, the on-site screener usually copies the collected IRVS data from the screeners laptop on to some type of transfer media (USB drive, CD, DVD, etc.) and then loads the data into the organization's Master Database. The screener uses the <Import Assessor Database> and Export to Transfer folder> buttons on the Administrative Functions Menu to transfer the files.

Note: if the screener records the IRVS screening data directly on the organization's Master Database, this step is not needed.

- First the Lead Screener opens his copy of the database to the main menu and left clicks on the <**Administrative Functions**> button to open the Administrative Functions Menu.
- Left click on the <**Export to Transfer Folder**> button.
- This will bring up a window that copies and exports the **IRVS database and screening record folder** (with the associated Photo, GIS files and Miscellaneous subfolders) from the current location to a new location selected by the user.
- Use the <**Browse**> button to identify where you want to transfer the files
- Click **Open** to select the folder.
- Then left click **Copy Files**.
- A window will appear asking to confirm that you want to transfer the files. Left click on **Yes**.



- A message will appear indicating that the transfer is complete. Left click on **OK** to return to the **Administrative Functions** Menu.
- The Lead Screener then gives his files on a transfer device to the Master Database operator (usually the IRVS Program Manager). The IRVS Program Manager uses the transfer device (USB drive, CD, DVD, etc.) to copy the screening files to a temporary location on his computer.

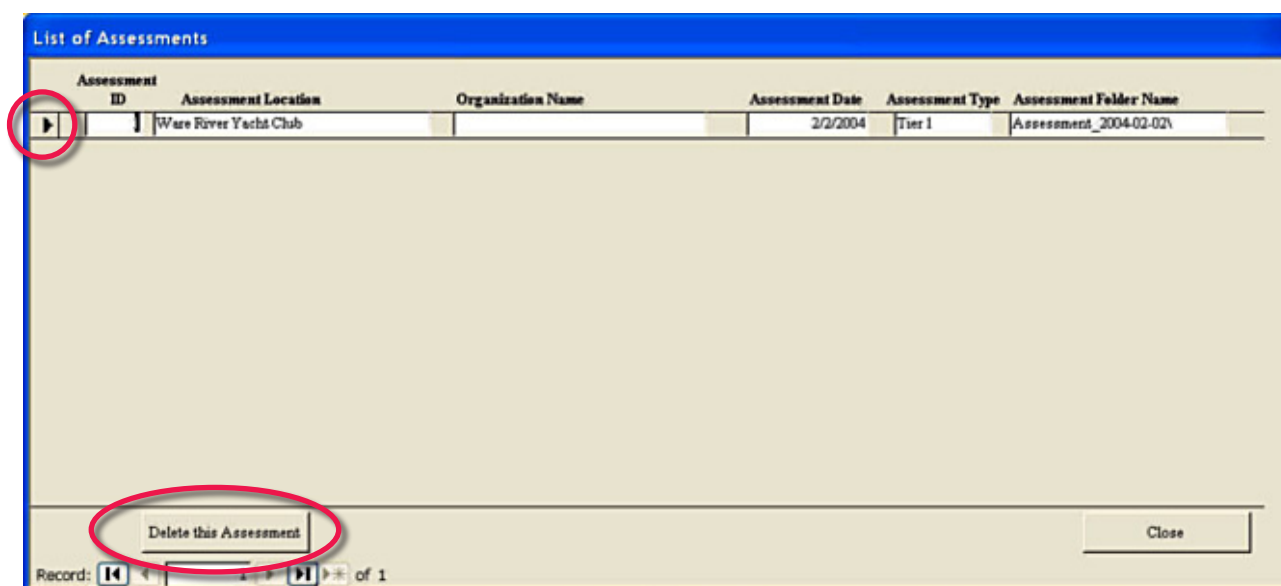


## Erase a Screening Record from Field Team Database

Administrators have the ability to erase a single screening record in the database, permanently. This purges the collected data of one single screening record from the laptop. Note data is erased, it cannot be recovered.

- First the Lead Screener opens his copy of the database to the main menu and left clicks on the **<Administrative Functions>** button to open the **Administrative Functions Menu**.
- Left click on the **<Delete a Screening>** button.
- Selecting the **<Delete a Screening Record>** button opens a list of screening records. Select the screening record to erase, then left click **<Delete This Assessment>**. This will open a confirmation window, to ensure you want to permanently erase the selected screening record. Left click on **<Yes>** to **continue** or **cancel**.

**Warning: this will erase the screening record from the database, permanently!**



## Section 6: IRVS Management Processes



- **Create a Filtered Listing of Records**
- **Plot Filtered Listing of Records**
- **Print IRVS Reports**

**T**he primary database at an organization's headquarters, referred to in this guide as the Master Database, is used by managers to store, search print, display and analyze data collected from multiple screenings. Capabilities include:

- Import collected IRVS data from Field Team databases
- Store, search and analyze data on multiple IRVS screenings
- Display and print a variety of reports
- Identify mitigation strategies
- Create a duplicate of an IRVS record for mitigation analysis or "What if" impacts resulting from changes to the Consequence, Threat, Vulnerability and Resiliency status
- Produce standard reports or export report data as a MS Word® or PDF® document for additional editing and formatting
- Export screening risk data to MS Excel® spreadsheets for additional editing and tracking
- Filter and sort screening records by site identification, address, sector and subsector identification, and facility importance
- Plot and display IRVS screening sites and risk values on the users digital mapping program
- Display the Total Risk Summary for one site or for a filtered list of sites.
- Store, display, and print collected digital photos, site plans, floor plans, emergency plans, certain GIS products, and other miscellaneous files collected during screenings
- Perform Database Administrative functions

### Create a Filtered Listing of Records

The IRVS Record Listing form displays a list of screening records in the database. The first time you enter the database (with no prior screenings entered), this list will be blank. As screenings are conducted or

transferred into the Master Database, new screening records are added to the bottom of the listing.

The top section of the form (marked with a ① in the diagram) enables the user to filter the list of records displayed using the fields labeled: **Facility Name**, **Screening Date**, **City**, **State**, **Site Type**, **Sector**, **Subsector**, and **Facility Importance**.

Enter a search term or use the drop down boxes under one or more of the columns to create a query. Then left click the <Search> button to filter the records and display a list of only those records that match the query. Left click the <Clear> button to clear the query and display all records in the database. Note: for date, use the “<”, “>” or “=” signs to set a range of dates to filter.

After a filtered list of screening records has been produced, use the bottom section of the form (marked with a ② in the diagram) to display, plot, and print screening details of these screening records.

The screenshot shows the 'IRVS Record Listing' window. The top section, labeled with a circled '1', is a search filter area with fields for Facility Name, Facility ID#, Screening No. / Date, Screening Comments, City, State, Site Type, Sector, Subsector, and Facility Importance. Below these fields are 'Search' and 'Clear' buttons. The bottom section, labeled with a circled '2', contains a row of buttons: 'Add New Site', 'Site ID, Address, Coordinates', 'Pre-field Questions', 'Site Evaluation', 'Site Summary', 'Exec Sum/PDC/Photos/GIS', and 'Help'. Below this row is another row of buttons: 'View All Summaries (Filtered List)', 'Plot (Filtered List)', 'Print Question Details (Filtered List)', 'Print Question Details (Selected Assessment)', 'Print All Details (Selected Assessment)', 'Print Risk Summary (Selected Assessment)', and 'Close'.

### View All Summaries (Filtered List)

After a filtered list of screening records has been produced, left click on the <View All Summaries [Filtered List]> button to display the **Total Risk Summary – Filtered List** form for only the filtered list of sites.

The **Total Risk Summary – Filtered List** form displays the same information as on a single screening record’s Risk and Resiliency Summary form. The Building, Tunnel, and Mass Transit Station summaries can be displayed on three separate Tabs or in a simultaneous view with all values displayed on one form. Use the <Switch to Tabbed View> button on the bottom of the form to toggle back and forth between views. Note, in the simultaneous view, the values for the Building screening records are displayed in the top section, the Mass Transit Station values are in the

middle section and the values from Tunnel screenings are on the bottom section. This facilitates comparison and analysis of risk and resiliency values between facilities. (See the catalog for an explanation of the **Risk Summary** values)

Total Risk Summaries - All Screenings																			
Buildings			Total Risk																
Site Name	Screening Number	Screening Date	Total Risk All Scenarios	Total Resiliency	Intrusion	Blast Interior	CBR Interior	Blast Exterior	CBR Exterior	Seismic	Flood	Wind	Fire	Internal Intrusion	Internal Explosive	Internal CBR	Explosive Zone 1	Explosive Zone 2	Explosive Zone 3
01	01	6/15/2011	25.9	56.8	30.5	26.8	25.7	25.8	25.3	8.5	6.2	0.8	0.8	30.5	26.0	25.7	16.0	2	
Mass Transit Stations																			
Site Name	Screening Number	Screening Date	Total Risk All Scenarios	Total Resiliency	Blast Internal	Blast External Direct	Blast External Collateral	CBR Internal	CBR Tunnel	CBR External	Fire Internal	Fire External	Fire Tunnel	Track Smoke	Other Flood	Other Collision	Other Cyber		
Tunnels																			
Site Name	Screening Number	Screening Date	Total Risk All Scenarios	Total Resiliency	Blast Internal	Blast External Direct	Blast External Collateral	CBR Internal	CBR Tunnel	CBR External	Fire Internal	Fire External	Fire Tunnel	Track Smoke	Other Flood	Other Collision	Other Cyber		

Note: Only Screening with up to date Summary Values will display

Switch to Tabbed View

Close

## Plot Filtered Listing of Records

After a filtered list of screening records has been produced, left click on the <Plot> button to display the display IRVS screening sites and risk values on the users digital mapping program .

The button generates a KML file and automatically opens the file for visualization on the users digital mapping program

- The process displays a 100 ft., 300 ft., and 1,000 ft. ring around the IRVS site
- The process also displays the following IRVS screening information about the site:

Name: \_\_\_\_\_

Site Type: \_\_\_\_\_

Sector: \_\_\_\_\_

IRVS Date: \_\_\_\_\_

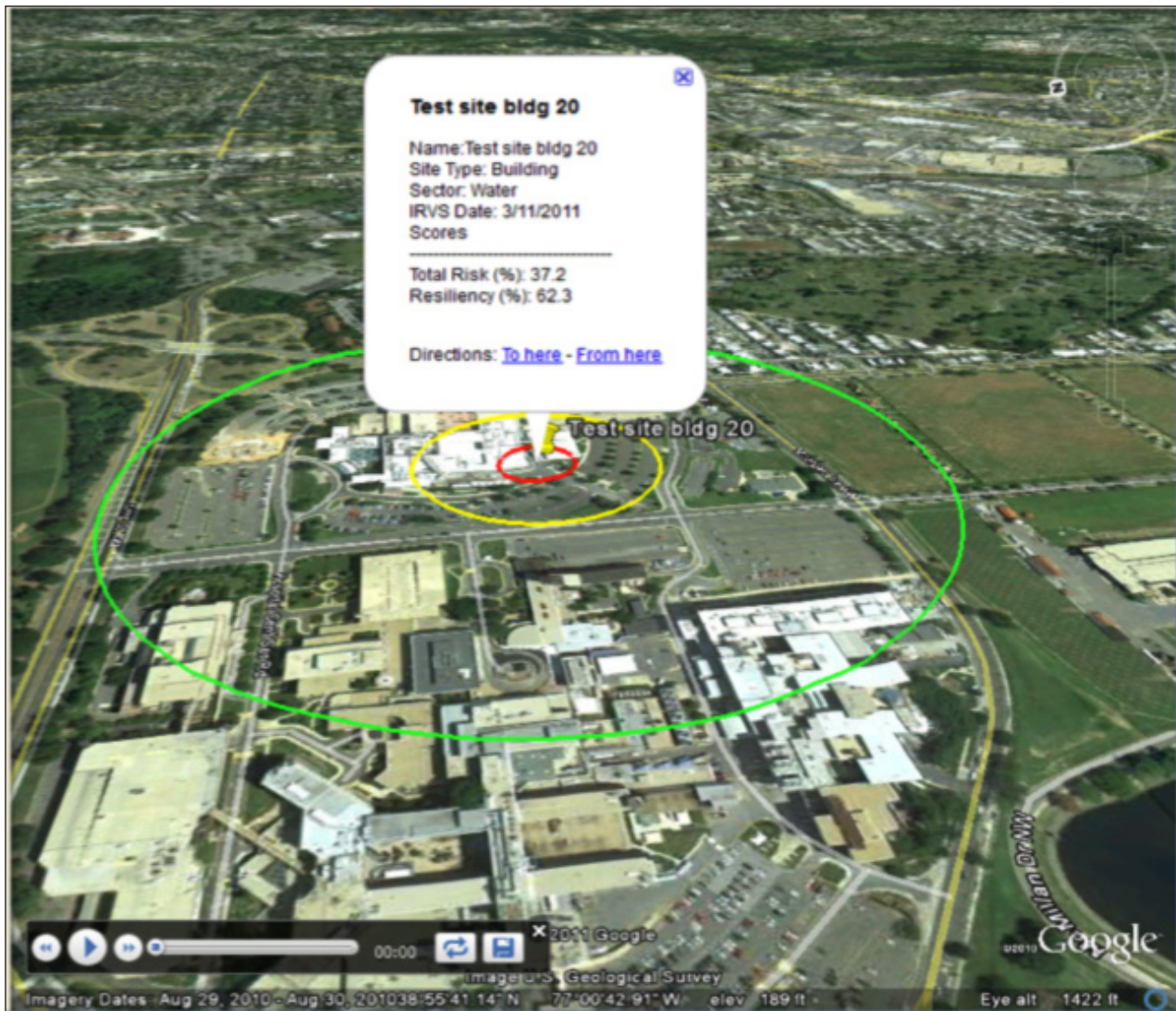
Scores \_\_\_\_\_

Total Risk (%): \_\_\_\_\_

Resiliency (%): \_\_\_\_\_



Note: As stated above in the system requirements listing, the database has an optional plotting function to display IRVS site coordinates and screening information on a digital map. The IRVS process can be completed without using this display function. The function requires the use of the computer systems existing mapping program capable of displaying a KML type file, such as Google Earth®. (Keyhole Markup Language (KML) is an XML-based language for defining the display of three-dimensional spatial data in the programs like Google Earth®.)

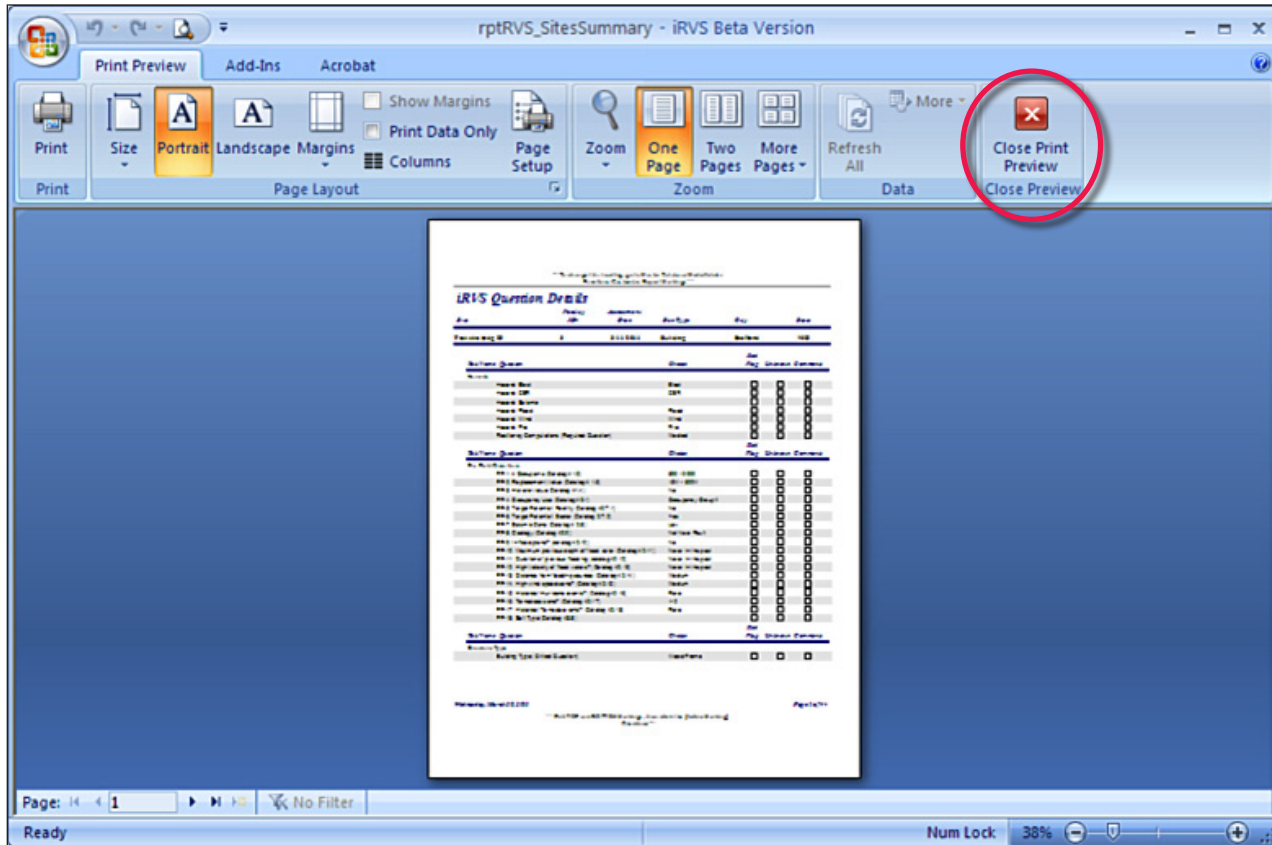




## Print IRVS Reports

The IRVS Record Listing form offers the user four options to produce standard reports or export report data as a MS Word® or PDF® document for additional editing and formatting:

- **Print Question Details (Filtered List):** After a filtered list of screening records has been established, the <**Print Question Details**> button opens to a print view screen and displays a long report consisting of the IRVS questions and answers for every screening record displayed on the filtered list. This view does not include the **Risk and Resiliency Summary** screen or the other details of the screening (such as POC listing, Screening Team members, executive summary). Note: When finished printing, use the <**Close Print Preview**> button not the “X” on the upper right corner of the form.
- **Print Question Details (Selected Screening Record)** After a single screening record has been selected , the <**Print Question Details (Selected Screening Record)**> button opens to a print view screen and displays a report consisting of the IRVS questions and answers for the single screening record selected on the filtered list. This view does not include the **Risk and Resiliency Summary** screen or the other details of the screening (such as POC listing, Screening Team members, executive summary). Note: When finished printing, use the <**Close Print Preview**> button not the “X” on the upper right corner of the form.
- **Print All Details (Selected Screening Record):** After a single screening record has been selected , the <**Print All Details (Selected Screening Record)**> button opens to a print view screen and displays a report consisting of an expanded amount of IRVS data collected about the single screening record selected on the filtered list. This view does not include the **Risk and Resiliency Summary** screen. Note: When finished printing, use the <**Close Print Preview**> button not the “X” on the upper right corner of the form.
- **Print Risk Summary (Selected Screening Record):** After a single screening record has been selected , the <**Print Risk Summary (Selected Screening Record)**> button opens to a print view screen and displays a report consisting of the **Risk and Resiliency Summary** screen. Note: When finished printing, use the <**Close Print Preview**> button not the “X” on the upper right corner of the form.



## Section 7: Administrative Functions



- **Empty the Database**
- **Delete a Single Screening Record**
- **Import Field Team Database**
- **Manage User Accounts**
- **Export IRVS Record to Transfer Folder**
- **Customize Report Handling Markings**
- **Change Passwords**

Note: administrative functions are not available to all users. Only those logged on with administrator permission can use the administrative functions menu. For example, only administrators may import field team records into to the Master Database.

### Empty the Database

Administrators have the capability to erase all records in a database, permanently. This is only done after transferring your data to a Master Database in a separate computer and when starting a new program. This enables an administrator to remove all database entries and start with an empty database. It also serves to control screening information.

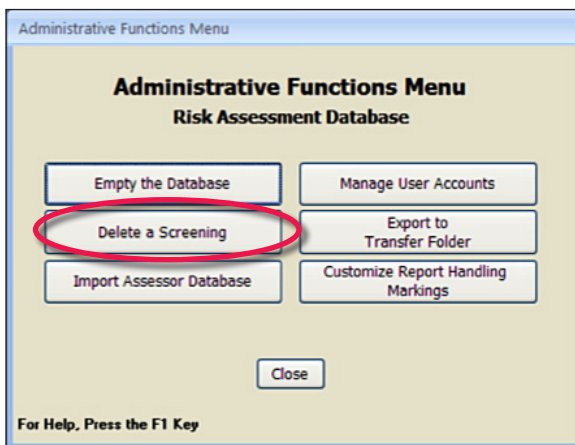
**Note: this is permanent. Confirm you have transferred the current information to the Master Database in a separate location before you erase the database.**

To empty the database:

1. From the Main Menu, left click on **Empty the Database**.
2. The next window confirms that you want to permanently erase all screening data (not just one screening record, but erase all records). Left click on **Yes** to continue or cancel.
3. You receive a 2nd warning stating that “This action is non-reversible!” Left click on **Yes** to continue or cancel.
4. You receive a final warning asking if you want to delete all files and folders. Left click on **Yes** to continue or **No** to cancel.
5. The files have now been deleted. Left click on **OK** to continue.
6. The next screen that appears during the “Empty the Database” process provides the administrator an option to keep their

customized system defaults or reset the labels to their original listings. Left click on each listed option to reset the labels to their original listings or to keep the administrators customized system defaults.

7. Finalize the process by left clicking on **Continue with these choices**.
8. **Warning: confirm you have transferred the information to the Master Database in a separate computer before you erase the data!**
9. Left click on **OK** to finish. The IRVS database will close. The next time the database is opened, a message will state the configuration table will be re-set. The purged database will have no screening records.



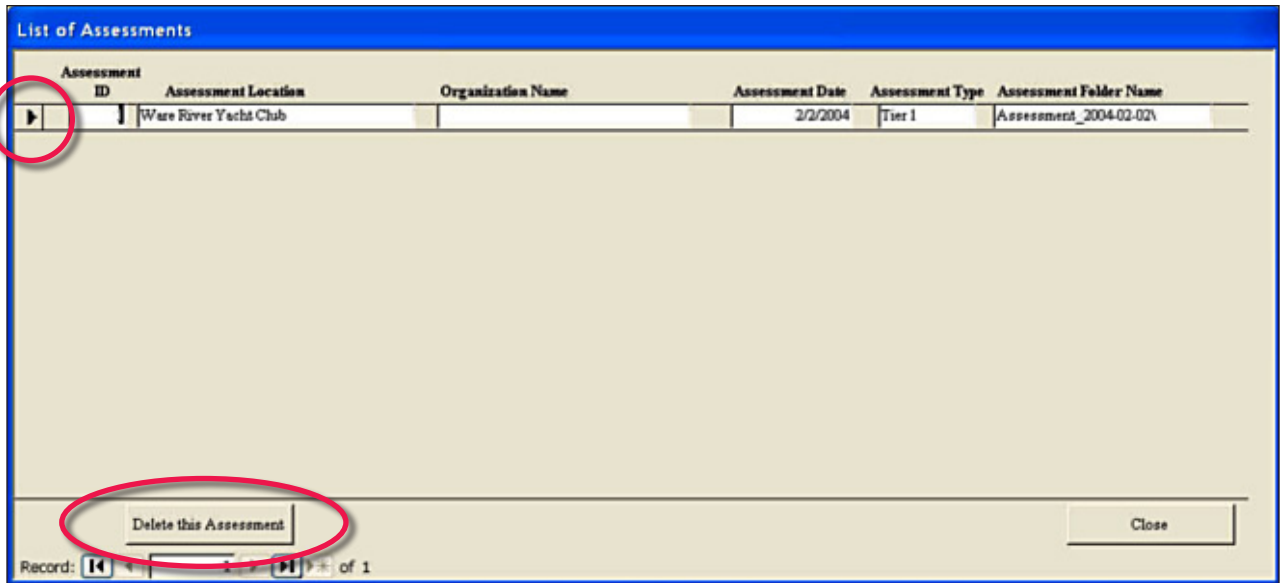
## Delete a Single Screening Record

Administrators have the ability to erase a single screening record in the database, permanently. This purges the collected data of one single screening record from the laptop. Note data is erased, it cannot be recovered.

- First open the database to the **Main Menu** form and left click on the **<Administrative Functions>** button to open the **Administrative Functions Menu**.
- Left click on the **<Delete a Screening>** button.

Selecting the **<Delete a Screening Record>** button opens a list of screening records. Select the screening record to erase and then left click **<Delete This Assessment>**. This will open a confirmation window, to ensure you want to permanently erase the selected screening record. Left click on **<Yes>** to continue or cancel.

**Warning: this will erase the screening record from the database, permanently!**



## Import Field Team Database

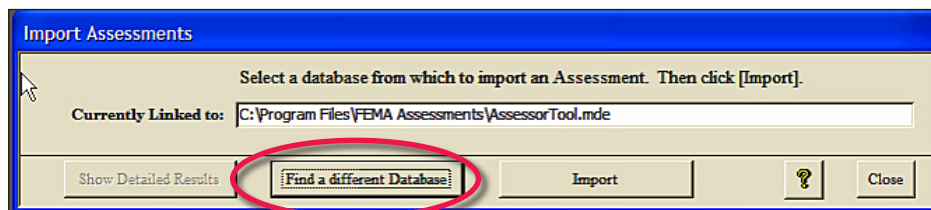
One of the most important features needed to understand in the **Administrative Functions Menu** is how to import the Field Team database into the Master Database.

After completing an IRVS screening, the Field Team database from the screeners laptop is copied on to some type of transfer media (USB drive, CD, DVD, etc.) in order to then load the data into the organization's Master Database. The screener uses the **<Export to Transfer folder>** button on the **Administrative Functions** Menu conduct the transfer. (This process was described in Section 6: Finish the IRVS Process, and is repeated in the below paragraph titled: Export IRVS Records to Transfer Media.)

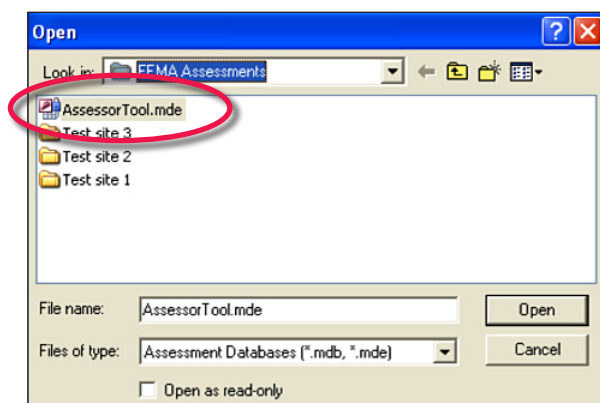
After you have the files transferred you can begin the process to import the Field Team database into the Master Database. Left click on **<Administrative Functions>** button from the **Main Menu**. This brings up the Administrative Functions Menu.

1. The Field Team Screener gives a copy of his IRVS files on a transfer device to the Master Database user (usually the IRVS database Administrator). The IRVS database Administrator uses the transfer device (USB drive, CD, DVD, etc.) to copy the screening files to a temporary location on his computer.
2. The IRVS database Administrator then opens the IRVS Master Database and left clicks on **<Administrative Functions>** button from the **Main Menu**.

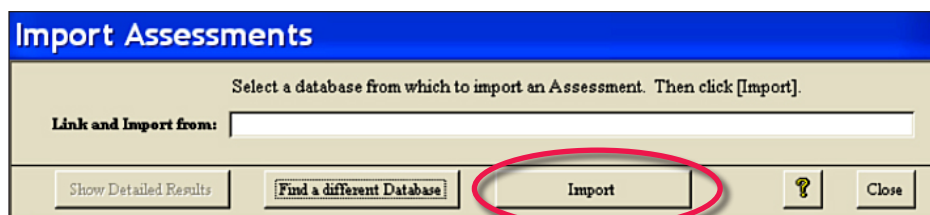
3. The Program Manager then left clicks on the <Import Assessor Database> button in the middle of the **Administrative Functions** Menu.
4. The next step is to find the IRVS database to import. The below screen opens with the last file identified to which the Master Database was linked.



5. Left click on the <Find a different Database> button to find the IRVS database that you just transferred to your computer and that you want to import.



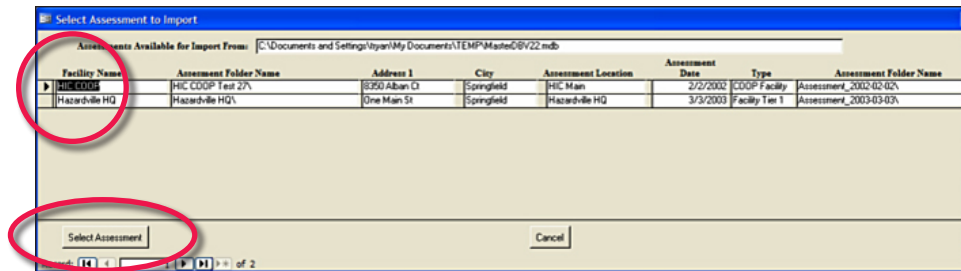
6. With this screen you identify the IRVS database that you want to import into the Master Database. Single left click on the file to import, which will put that file into the File Name window and then left click on the <Open> button OR double left click on the file to link to this file.
7. Returning to the **Import Assessments** screen the **Link and Import** window now correctly identifies the database to be imported.
8. Left click the <Import> button to initiate the import.



9. A confirmation screen then pops up to ensure this is the desired action for the indicated file. Left click on <Yes> to continue.
10. The import function confirms the linking to the desired database has been accomplished. Left click on <OK> to continue.



11. A screen opens with a list of facilities that can be imported. Place the arrow on the facility to be imported and left click on <Select Assessment>.



12. The database will then ask if you want to move the supporting files tied to the screening record as well (such as attached photo's). Left click on <Yes> to make these transfers. Note: if there are no files in a given folder, the computer will state there are no files to transfer.



13. The final confirmation pop-up you will see will ask if you want to write the files now. Left click <Yes> to complete the import process. As in every process, it is always necessary to confirm that what you wanted to have done was actually done.
14. Left click on <OK> to finish.
15. After completing the import function, left click on <Show Detailed Results> to check that all transfers were successful.

## Detailed Diagnostics

The **Import Detailed Diagnostics** screen shows what was in the Master Database before the import, the number of records attempted by the import, and the records after the import. It is recommended to do a quick check by scanning the right hand column, titled Successful, to ensure all boxes are checked.

Another check is to scan Row 4, Assessments. The number of screening records in the Lead Assessor's database being imported should match the number of screening records attempted. Left click on **Close** to close the window and return to the previous screen. This completes the import function.

Import Order	Importing	NumberOf RecordsBefore	NumberOf RecordsAttempted	NumberOf RecordsAfter	Successful
1	Facilities	3	1	4	✓
2	Buildings	5	5	5	✓
3	People	890	179	1069	✓
4	Assessments	3	1	4	✓
5	Observations	993	331	1324	✓
6	Vulnerabilities	40	20	60	✓
7	Executive Summary	3	1	4	✓
8	Critical Infrastructure	51	20	71	✓
9	Critical Functions	34	18	52	✓
10	Assessment Personnel	9	5	14	✓
11	GIS images this assessment	6	3	9	✓
12	Photos	90	42	108	✓
13	Assessment Photos	12	6	18	✓
14	Miscellaneous files	2	1	3	✓
15	COOP Essential Functions	3	0	3	✓
16	COOP Deployment Planning	2	0	2	✓
17	COOP Alternate Facility	2	0	2	✓
18	Remediation Costs	32	16	48	✓
19	Defined Threats	45	15	60	✓

Record: 14 of 19

## Manage User Accounts

The <Manage User Accounts> button enables an administrator to add a new user, delete a user and assign permission levels to users. Reminder: the database is preloaded with the following four users and passwords:

- **Name:** Administrator      **Password:** Administrator
- **Name:** Assessor      **Password:** Assessor
- **Name:** Editor      **Password:** Editor
- **Name:** Reader      **Password:** Reader

These passwords are examples only and should be changed after installing the program. Note that the password for the four original users can change, but these four user names cannot be deleted. This is a safety feature to prevent a user from erasing all Administrators from the program.

An Administrator can add a new user, delete a user and assign or change their permission level, referred to as a Group. Select <Manage User Accounts> to start the process.

## User Groups

Three user groups have been created for the database in the Workgroup File:

- Admins
- Full Data Users
- Read Only Users

**Admins** have full access to the database. The **Administrative Functions** button will only be visible for users in the Administrator group. The IRVS database starts with two users in this group, **Administrator** and **Assessor**. They have the initial passwords of “**Administrator**” and “**Assessor**” (Do not include the quotation marks, i.e. ” ”, in the password.). It is highly recommended to assign them a different password in the Master Database after initial installation.

**Full Data Users** can view and update data, but not perform administrative functions. The IRVS database starts with one user in this group, **Editor**, which has the initial password of ” **Editor** ”. (Do not include the quotation marks, i.e. ” ”, in the password.)

**Reader** can only view data. The IRVS database starts with one user in this group, **Reader**, which has an initial password of “**Reader**”. (Do not include the quotation marks, i.e. ” ”, in the password.)

List of Users and the Group to which they belong

User ID	User Name	Group
1	Administrator	Admins
2	Assessor	Admins
3	Editor	Full Data Users
4	Reader	Read-Only Users

Administrator, Assessor, Editor, and Reader passwords can be changed, but the user names and groups cannot be modified.

Record: 1 of 4

Note that the password and permission level for the four original user names can be changed, but these four original user accounts cannot be deleted.

### Add a New User

1. From the **Administrative Functions Menu**, left click on **Manage User Accounts**.
2. From the form labeled “List of Users and the Group to which they belong”, left click <**Add New User**> button to add a new user name to the database.
3. A screen opens called “**Add a New User Account**”. On this screen, type in the new user name.
4. Left click on the downward facing arrow under **Group**.



5. Select from the response field drop down list a users group (permission level).
6. After making entries, left click on the <**Add User**> button to finalize the account.
7. Left click on **OK** to finish.

### Delete a User

1. The first step is to select one of the existing users by left clicking on the far left column of the form labeled “List of Users and the Group to which they belong”. This will mark the user desired with a right pointing arrow head if one is not already there. This selects the user and links the buttons across the bottom to that user.
2. Next left click on the **Delete User** button to delete a user name from the database.
3. A warning screen opens asking you to confirm the deletion. Left click **Yes** to continue, or **No** or **Cancel** to cancel the action.
4. Left click on **OK** to finish.

## Change a User's Group

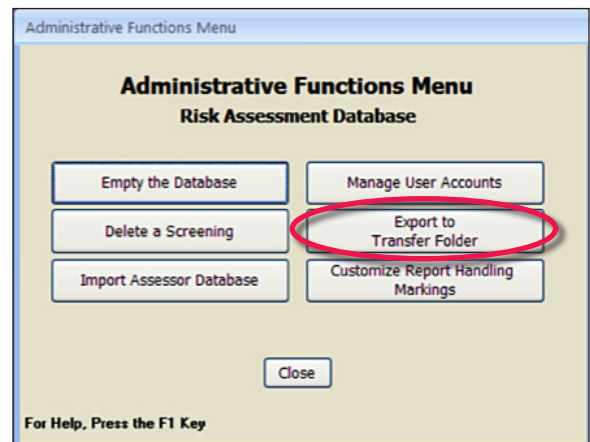
1. The first step is to select one of the existing users by left clicking on the far left column of the form labeled "List of Users and the Group to which they belong". This will mark the user desired with a right pointing arrow head if one is not already there. This selects the user and links the buttons across the bottom to that user.
2. Next left click on the **Change Group for:...** button to change the group of a user from the database. Notice that name of the user selected on the top of the form is displayed in the button **Change Group for:** This is designed to help the Administrator keep track of the account they are working on.
3. A screen opens asking you to select a Group from a drop down Menu. Left click on the downward facing arrow below **Group**.
4. Left click on one of the options from the drop down menu.
5. Left click **Change Group** to continue or **Cancel** to cancel the action.
6. A message appears stating that the user has been removed from the group. Left click on **OK**.
7. A second message appears stating that the user has been now added to the designated group. Left click on **OK** to finish.

## Export IRVS Records to Transfer Media

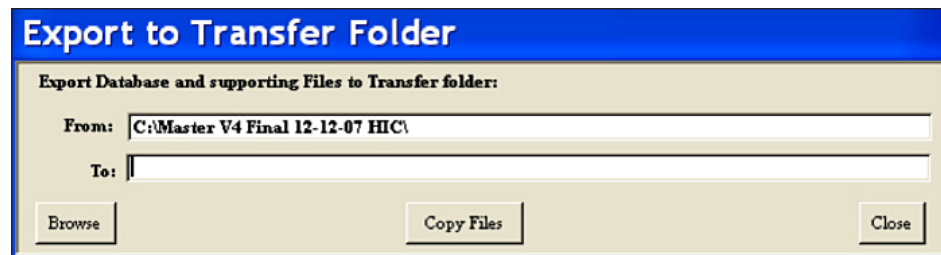
After completing an IRVS screening, the on-site screener usually copies the collected IRVS data from the screeners laptop on to some type of transfer media (USB drive, CD, DVD, etc.) in order to then load the data into the organization's Master Database. The screener uses the <Export to Transfer folder> button on the Administrative Functions Menu to transfer the files.

Note: if the screener records the IRVS screening data directly on the organization's Master Database, this step is not needed.

- First the Lead Screener opens his copy of the database to the main menu and left clicks on the <**Administrative Functions**> button to open the **Administrative Functions Menu**.
- Left click on the <**Export to Transfer Folder**> button.



- This will bring up a window that copies and exports the IRVS database and screening record folder (with the associated Photo, GIS files and Miscellaneous subfolders) from the current location to a new location selected by the user.
- Use the <**Browse**> button to identify where you want to you want to transfer the files
- Click **Open** to select the folder.
- Then left click **Copy Files**.
- A window will appear asking to confirm that you want to transfer the files. Left click on **Yes**.
- A message will appear indicating that the transfer is complete. Left click on **OK** to return to the **Administrative Functions Menu**.
- The Lead Screener then gives his files on a transfer device to the Master Database operator (usually the IRVS Program Manager). The IRVS Program Manager uses the transfer device (USB drive, CD, DVD, etc.) to copy the screening record files to a temporary location on his computer.



## Customize Report Handling Markings

The database administrator can establish customized report handling markings that will be automatically printed on the top and bottom of all reports.

1. Select <**Customize Report Handling Markings**> from the **Administrative Functions Menu**.
2. A screen is opened displaying the “**Report Page Markings - TOP**” entry area on the left and the “**Report Page Markings - BOTTOM**” list on the right. From this form, the system allows administrators to create numerous sets of markings.
3. The default marking can be edited by right clicking in the text box.



4. Additional sets of top and bottom markings can be established by selecting the **New Report Marking** button.
5. Selecting the **Active Marking** checkbox on the far right designates which marking will be used during printing of reports.

## Change Passwords

Each user has the ability to change their password associated with their own user name from the Main Menu form. When a user name is initially created by an IRVS Database administrator, the password is blank.

1. To enter the database, simply enter the new user name (assigned by the IRVS Database Administrator), leave the password field blank, and left click **OK**.
2. The program will then force new user to create a password.

It is highly recommended to change all pre-existing passwords for the four pre-established user names at after installing the database (pre-established user names: **Administrator**, **Assessor**, **Editor**, **Reader**). To do this:

1. Log in with each user name
2. From the Main Menu, select **Change Password** which opens the Change Password Form
3. Your user name is pre-populated in the top box
4. Enter your existing password in the **Old Password** box
5. Enter a new password in the **New Password** box

6. Verify your entry by re-typing the new password in the **Verify** box
7. Left click on **Cancel** to cancel
8. Left click **Set Password** to complete the password change
9. Left click on **OK** to finish

Note that passwords must be eight characters long and they must include at least three of the four characters from the following categories:

- Lower case letters (a to z)
- Upper case letters (A to Z)
- Numbers (0 to 9)
- Special characters ( `!@#, etc. )

# Data Collection Form: Paper Version





## Pre-Field Information

Complete the information on this page before the field assessment, using additional sheets as needed. The numbers in parentheses refer to the ID number in the catalog. Refer to the catalog for explanations of the information that is requested on this page and the potential sources of the information.

Station name/identification _____	<b>Target Density.</b> Number of potential high-value/CIKR targets/buildings within 300 feet and between 300 and 1000 feet of any point of the perimeter of the station (1.7).	
Address/intersection _____	<b>CIKR Sector</b>	<b>Within 300 feet</b>
Transit agency _____	Agriculture and Food	<b>From 300 to 1000 feet</b>
Year built _____	Banking and Finance	
Overview of the station from the transit agency _____	Chemical	
_____	Commercial Facilities	
_____	Communications	
_____	Critical Manufacturing	
Number of tracks (1.1) _____	Dams	
Number of levels (1.2) _____	Defense Industrial Base	
Station elevation (1.3) _____	Emergency Services	
Replacement value (1.10) _____	Energy	
Peak daily ridership/transfers (1.4) _____	Government Facilities	
Terrorist threats against the station (2.3) _____	Healthcare and Public Health	
_____	Information Technology	
Terrorist threats against the transit system (2.4) _____	National Monuments/Icons	
_____	Nuclear Reactors, Materials, and Waste	
History of flooding affecting the station since opening(2.11) _____	Postal and Shipping	
_____	Transportation Systems	
Geology: Soil conditions (3.9) _____	Water	
Year(s) of major retrofits (5.3) _____	<b>TOTAL</b>	
Retrofit description _____		
Operating hours (12.8) _____		

## 1. Consequences Rating

Characteristic		Attribute Options					Red Flag	Comments
		(a)/(f)	(b)/(g)	(c)/(h)	(d)/(i)	(e)/(j)		
1.1	Number of Tracks	1	2	3 – 4	5 – 8	> 8		
1.2	Number of Station Levels	1	2	3	> 3			
1.3	Station Elevation	At grade	Above grade	Below grade (above water table)	Above water	Below grade, below water table		
1.4	Peak Number of Riders/Transfers per Day	< 1,000	1,000 – 2,000	2,000 – 5,000	5,000 – 10,000	10,000 – 20,000		
		50,000 – 100,000	100,000 – 150,000	150,000 – 200,000	> 200,000			
1.5	Station Locality	Remote	Rural	Urban	Dense urban	—		
1.6	Nearby/Adjacent Transportation Systems or Public Assembly Structures Venues	None	Close	Tightly integrated	—	—		
1.7	High-Value Targets/CIKR Targets	None	1 – 6	7 – 12	13 – 19	≥ 20		
		None	1 – 6	7 – 12	13 – 19	≥ 20		
1.8	Impact of Physical Loss/Criticality	Local	Regional	National	—	—		
		Local	Regional	National	—	—		
1.9	Social Impact	Low	Moderate	High	—	—		
1.10	Replacement Value (in millions of dollars)	< \$1m	\$1m – \$5m	\$5m – \$20m	\$20m – \$50m	\$50m – \$100m		
		\$200m – \$350m	\$350m – \$600m	\$600m – \$900m	> \$900m			
1.11	Operational Redundancy	Very high	High	Moderate	Low	Very low		
1.12	Estimated Down Time after a Major Disaster	Very short	Short	Moderate	Long	Very long		

## 2. Threat Rating

Characteristic		Attribute Options					Red Flag	Comments
		(a)	(b)	(c)	(d)	(e)		
2.1	Station Locality	Remote	Rural	Urban	Dense urban			
2.2	Peak Number of Riders/Transfers per Day	< 1,000	1,000 – 2,000	2,000 – 5,000	5,000 – 10,000	10,000 – 20,000		
	20,000 – 50,000	50,000 – 100,000	100,000 – 150,000	150,000 – 200,000	> 200,000			
2.3	Terrorist Threat (Credible)	No	Previous	Current	—	—		
			Previous	Current	—	—		
2.4	High Value Targets/CIKR Targets	0	1 – 6	7 – 12	13 – 19	> 20		
			1 – 6	7 – 12	13 – 19	> 20		
2.5	Significance of Station	Local	Regional	National	International			
2.6	Function Criticality (within System/Region)	Very low	low	Moderate	High	Very high		
2.7	Number of Entrances/Exits	1 – 2	3 – 4	5 – 8	9 – 12	>12 or unlimited		
2.8	Plaza/Public Area	N/A	None	Well-controlled	Moderate-control	Not-controlled		
2.9	Protective Deterrence Measures	High	Medium	Low	—	—		
2.10	Accessibility of Off-Duty Vehicles/Equipment	N/A	No accessibility	Low accessibility	Moderate accessibility	High accessibility		
2.11	Flooding History	N/A	None	Limited	Moderate	Severe		



### 3. Vulnerability Rating: Site

Characteristic		Attribute Options					Red Flag	Comments
		(a)	(b)	(c)	(d)	(e)		
(a)								
(b)								
3.1	Presence of Stand Pipes/Fire Hydrants (Water Supply)	Yes	No	—	—	—		
3.2	Water Drainage	Excellent	Medium	Limited	Deficient	—		
3.3	Natural Barriers	N/A	High	Medium	Low	—		
3.4	Manmade Barriers	N/A	High	Medium	Low	—		
	3.4.1 Barriers/Bollards							
	3.4.2 Fencing	N/A	High	Medium	Low	—		
3.5	Station Elevation	At grade	Above grade	Below grade (above water table)	Above water	Below grade, below water table		
3.6	Depth of Cut and Cover above Station	N/A	Deep	Shallow	Exposed	—		
3.7	Concourse	No	Yes	—	—	—		
3.8	Adjacent buildings	None	Some	Numerous	—	—		
3.9	Geology (Soil Condition)	Hard-rock	Medium	Poor	—	—		
3.10	Accessibility of off-duty vehicles/equipment	N/A	None	Low accessibility	Moderate accessibility	High Accessibility		
3.11	Hazardous Material Storage	No	Yes	—	—	—		

## 4. Vulnerability Rating: Architectural

Characteristic		Attribute Options						Red Flag	Comments
		(a)/(f)	(b)/(g)	(c)/(h)	(d)/(i)	(e)/(j)			
4.1	Number of Entrances	1	2 – 4	≥ 5	—	—			
4.2	Retail Spaces	None	Low	Medium	High	Very high			
4.3	Integrated/Adjacent Parking garages	None	Adjacent parking	Staff only parking	Public parking	—			
4.4	Lobbies (Number and Size)	None	1 small	1 medium	1 large	2 small			
		2 medium	2 large	3+ small	3+ medium	3+ large			
4.5	Number of Observable or Concealed/Not Observable Occupied Spaces	None	No (1 – 2)	No (3+)	Yes (1 – 2)	Yes (3+)			
4.6	Service Entrances	N/A	No	Yes	—	—			
4.7	Crowding/Congestion	Multiple exit types	Escalators only	Stairs only	Elevators only	—			
4.8	Emergency Exits	More than 4	3 – 4	2	1	none			
4.9	Number of Levels	1	2 – 3	More than 3	—	—			
4.10	Ease of Egress from Vehicle/Trains to Station	Difficult	Moderate	Easy	—	—			
4.11	Plaza/Public Areas	N/A	None	Well-controlled	Moderate Control	Not controlled			

## 5. Vulnerability Rating: Structural

Characteristic	Attribute Options					Red Flag	Comments
	(a)	(b)	(c)	(d)	(e)		
5.1 Liner Relative Thickness	N/A	Thick	Medium	Thin	Very thin		
5.2 Construction material	High strength concrete/steel	Steel/concrete/prestressed concrete	Wrought iron	Non-reinforced concrete	Masonry or brick		
5.3 Known Retrofits	Yes	No	—	—	—		
5.4 Longest Span	N/A	< 15 feet	25-40 feet	40 – 50 feet	> 50feet		
5.5 Controlling Height	N/A	< 15 feet	25-40 feet	40 – 50 feet	> 50feet		
5.6 Type of Framing	Shell	Plate	Frame	—	—		
5.7 Seismic Design	N/A	Yes	No	—	—		
5.8 Overall Structural Conditions	Excellent	Good	Average	Below average	Poor		

## 6. Vulnerability Rating: Ventilation Vulnerabilities

Characteristic		Attribute Options					Red Flag	Comments
		(a)	(b)	(c)	(d)	(e)		
6.1	Protection of Ventilation Shafts	N/A	Well protected	Somewhat protected	Not protected	—		
6.2	Protection of Ventilation Structures	N/A	Well protected	Somewhat protected	Not protected	—		
6.3	Redundancy of Ventilation Systems	N/A	Yes	No	—	—		
6.4	Ventilation Hardware Exposure	N/A	Hardened enclosure	Covered, not hardened	Visible	—		

## 7. Vulnerability Rating: Fire Protection System Vulnerabilities

Characteristic		Attribute Options					Red Flag	Comments
		(a)	(b)	(c)	(d)	(e)		
7.1	Code Inspection	Yes	No	—	—	—		
7.2	Backup Power System	Yes	No	—	—	—		
7.3	Emergency Lighting System	Yes	No	—	—	—		
7.4	Automatic Fire Control Automatic Detection Systems	7.4.1 Automatic Detection System	No	—	—	—		
		7.4.2 Fire Control Panel	No	—	—	—		
		7.4.3 Automatic Detection System Reporting	N/A	Fire department	Off-site control center	Station control panel		
		7.4.4 Activation System	N/A	Release security devices and recall elevators	None	No one – local alarm only		
7.5	Smoke Dampers in Ventilation System	Yes	No	—	—	—		
7.6	Sprinkler System	7.6.1 Automatic Sprinkler System	No	—	—	—		
		7.6.2 Coverage of Automatic Sprinkler System	N/A	Entire station	Partial coverage	—		
		7.6.3 Alternate Automatic Extinguishing System	Combination	Clean agent/water mix	Dry chemical	None		
7.7	Station Knox Box	Yes	No	—	—	—		
7.8	Fare Collection System	Open access	Automatic	Restricted turn style	—	—		

## 8. Vulnerability Rating: Operational Systems

Characteristic		Attribute Options					Red Flag	Comments
		(a)	(b)	(c)	(d)	(e)		
8.1	Power Supply and Distribution: Enclosures	Well protected	Marginally protected	Not protected	—	—		
8.2	Surveillance and Control	Complete	Partial	None	—	—		
		High	Medium	Low	—	—		
8.3	Public Address and Communications	Low ridership (see ID I.4)						
		Class 3	Class 2	Class 1	Present – non-operational	None		
		High ridership (see ID I.4)						
		Class 3	Class 2	Class 1	Present – non-operational	None		
		High	Moderate	Limited	—	—		
		Low ridership (see ID I.4)						
8.4	Quality of Lighting	Class 3	Class 2	Class 1	Present – non-operational	None		
		High ridership (see ID I.4)						
		Class 3	Class 2	Class 1	Present – non-operational	None		
		High	Moderate	Limited	—	—		
		High	Medium	Low	—	—		
		High	Medium	Low	—	—		





9. Vulnerability Rating: Nonstructural Vulnerabilities

Characteristic	Attribute Options					Red Flag	Comments
	(a)	(b)	(c)	(d)	(e)		
9.1 Quality of Security Personnel Booths	High	Medium	Low	None	—		
9.2 Fixture Attachments	Secured	Not secured	—	—	—		
9.3 Quality of Barriers/Curbs	High	Medium	Low	None present	—		

## 10a. Vulnerability Rating: Physical Security Vulnerabilities

Characteristic	Attribute Options					Red Flag	Comments
	(a)	(b)	(c)	(d)	(e)		
10.1a Access Control	Yes	No	—	—	—		
10.2a Intrusion Detection Systems	Yes	No	—	—	—		
10.3a Video and Surveillance Assessment – Monitored CCTV	Yes	No	—	—	—		
10.4a Chemical, Biological, Radiological, Nuclear, Explosive (CBRNE) Detection Equipment	Yes	No	—	—	—		
10.5a Personnel/Baggage CBRNE Screening	Yes	No	—	—	—		
10.6a Vehicular CBRNE Screening	Yes	No	—	—	—		
10.7a Mobile Personnel/Baggage CBRNE Screening	Yes	No	—	—	—		
10.8a Unarmed Guards/Patrol	Yes	No	—	—	—		
10.9a Armed Guards/Patrols	Yes	No	—	—	—		
10.10a Law Enforcement Patrols	Yes	No	—	—	—		
10.11a Asset-related Communications	Yes	No	—	—	—		
10.12a Special Weapons and Tactics (SWAT) Teams	Yes	No	—	—	—		
10.13a Explosion Ordinance Disposal (EOD) Teams	Yes	No	—	—	—		
10.14a Interdiction-related Communications	Yes	No	—	—	—		
10.15a Waterside Intrusion Detection Systems	Yes	No	—	—	—		
10.16a Vessel Boarding Teams	Yes	No	—	—	—		
10.17a Dive Teams	Yes	No	—	—	—		

**10a. Vulnerability Rating: Physical Security Vulnerabilities (cont.)**

<b>Characteristic</b>	<b>Attribute Options</b>					<b>Red Flag</b>	<b>Comments</b>
	(a)	(b)	(c)	(d)	(e)		
<b>10.18a</b> Patrol Boats	Yes	No	—	—	—		
<b>10.19a</b> Transit/Maritime Domain Command and Control	Yes	No	—	—	—		
<b>10.20a</b> Unarmed Guards (Waterside)	Yes	No	—	—	—		
<b>10.21a</b> Armed Guards (Waterside)	Yes	No	—	—	—		
<b>10.22a</b> Law Enforcement Patrols (Waterside)							

**10b. Vulnerability Rating: Physical Security Vulnerabilities (cont.)**

<b>Characteristic</b>	<b>Attribute Options</b>					<b>Red Flag</b>	<b>Comments</b>
	(a)	(b)	(c)	(d)	(e)		
<b>10.1b</b> Blast Threat: Internal	8 or more	4 – 7	1 – 3	None	—		
<b>10.2b</b> Blast Threat: External (Direct)	High	Effective	Minimal	Ineffective	No security		
	5 or more	3 – 4	1 – 2	None	—		
<b>10.3b</b> Blast Threat: External (Direct)	High	Effective	Minimal	Ineffective	No security		
	5 or more	3 – 4	1 – 2	None	—		
<b>10.4b</b> CBR Threat: Internal	High	Effective	Minimal	Ineffective	No security		
	5 or more	3 – 4	1 – 2	None	—		
<b>10.5b</b> CBR Threat: Tunnel	High	Effective	Minimal	Ineffective	No security		
	5 or more	3 – 4	1 – 2	None	—		

## 10b. Vulnerability Rating: Physical Security Vulnerabilities (cont.)

Characteristic		Attribute Options					Red Flag	Comments
		(a)	(b)	(c)	(d)	(e)		
10.6b CBR Threat: External	10.6b.1 Number of Systems	5 or more	3 – 4	1 – 2	None	—		
	10.6b.2 Overall System Effectiveness	High	Effective	Minimal	Ineffective	No security		
10.7b Fire Threat: Internal	10.7b.1 Number of Systems	5 or more	3 – 4	1 – 2	None	—		
	10.7b.2 Overall System Effectiveness	High	Effective	Minimal	Ineffective	No security		
10.8b Fire Threat: External	10.8b.1 Number of Systems	5 or more	3 – 4	1 – 2	None	—		
	10.8b.2 Overall System Effectiveness	High	Effective	Minimal	Ineffective	No security		
10.9b Fire Threat: Tunnel/ Track/Smoke	10.9b.1 Number of Systems	5 or more	3 – 4	1 – 2	None	—		
	10.9b.2 Overall System Effectiveness	High	Effective	Minimal	Ineffective	No security		
10.10b Other Threats: Flood/Flooding	10.10b.1 Number of Systems	5 or more	3 – 4	1 – 2	None	—		
	10.10b.2 Overall System Effectiveness	High	Effective	Minimal	Ineffective	No security		
10.11b Other Threats: Collision (Grade/ Tunnel/Elevated)	10.11b.1 Number of Systems	5 or more	3 – 4	1 – 2	None	—		
	10.11b.2 Overall System Effectiveness	High	Effective	Minimal	Ineffective	No security		
10.12b Other Threats: Cyber	10.12b.1 Number of Systems	5 or more	3 – 4	1 – 2	None	—		
	10.12b.2 Overall System Effectiveness	High	Effective	Minimal	Ineffective	No security		

## 11. Vulnerability Rating: Cyber Security

Characteristic	Attribute Options						Red Flag	Comments
	(a)	(b)	(c)	(d)	(e)			
11.1 Effectiveness of Cyber Security Plan	High	Medium	Low	None	—			
11.2 Effectiveness of Training Programs	High	Medium	Low	None	—			
11.3 Security of Communication, Signal, and Power Systems	Secured	Medium	Low	No security	—			
11.4 Redundancy of Communication Systems	Yes	No	—	—	—			
11.5 Security of Power Supply	Secured	Medium	Low	No security	—			
11.6 Effectiveness of Wireless, Radio, or Satellite Systems During Emergencies	High (regional)	Medium (within jurisdiction)	Low (system only)	—	—			

## 12. Vulnerability Rating: Organizational Resilience

Characteristic	Attribute Options						Red Flag	Comments
	(a)	(b)	(c)	(d)	(e)			
12.1 Emergency Plan	Yes	No	—	—	—			
12.2 Emergency Response Exercises	Full scale	Table top	Workshop	None	—			
12.3 Effectiveness of Emergency Plans	High	Effective	Minimal	Ineffective				
12.4 Security Plan	Yes	No	—	—	—			
12.5 Security Plans Update Status	Within 12 Months	1 – 2 years	2 – 5 years	More than 5 years	None			
12.6 Transit Agency Mass Evacuation Plan	Yes	No	—	—	—			
12.7 Effectiveness of Mass Evacuation Plan	High	Effective	Minimal	Ineffective	—			
12.8 Continuity of Security	No	Yes	—	—	—			
12.9 Report/Exchange Threat Information	Frequent	Seldom/infrequent	None	—	—			
12.10 Training Programs	Well established	Marginal	None	—	—			
12.11 Coordinated Efforts of Local/Regional First Responders	Well established	Marginal	None	—	—			





# DHS Infrastructure Taxonomy

## Infrastructure Taxonomy<sup>1</sup>

This appendix contains an abbreviated version of the Infrastructure Taxonomy prepared by the Department of Homeland Security. It provides a listing of facility types included as part of each of the 18 critical infrastructure categories. Selected facilities provided below focus on facility types that include buildings. This appendix can be used as a reference for tabulating the target density information provided on page 1 of the Data Collection Form).

### Agriculture and Food

- Supply
- Processing/Packaging/Production
- Agriculture and Food Product Storage
- Agriculture and Food Product Transportation
- Agriculture and Food Product Distribution
  - Farm Product Wholesalers
  - Grocery and Related Product Wholesalers

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<sup>1</sup> Source: DHS, 2006, Infrastructure Taxonomy, Version 2, Risk Management Division Office of Infrastructure Protection, Department of Homeland Security, Washington, D.C.



- Food and Beverage Retailers
  - Supermarkets and Grocery Stores
- Food Service and Drinking Facilities
  - Full Service Restaurants
  - Limited Service Food Facilities
  - Drinking Establishments
    - Bars
    - Nightclubs
- Agriculture and Food Supporting Facilities
- Regulatory, Oversight, and Industry Organizations

## Banking and Finance

- Banking and Credit
- Securities, Commodities, and Financial Investments
- Insurance Carriers

## Chemical

- Chemical Manufacturing Plants
- Hazardous Chemical Transport
- Hazardous Chemical Storage/Stockpile/Utilization/Distribution
- Regulatory, Oversight, and Industry Organizations

## Commercial Facilities

- Entertainment and Media Facilities
  - Broadcasting
    - Cable and Other Subscription Programming
    - Radio Broadcasting
    - Television Broadcasting
  - Internet Publishing
  - Motion Picture and Sound Recording Facilities
  - Print Media



- Newspaper and Periodical Publishing
- Other Print Publishing
- Gambling Facilities/Casinos (Resorts)
  - Gambling Cruises Horse and Dog Racetracks
  - Land-Based Casinos
  - Permanently-Moored Casinos
  - Riverboat Casinos
  - Other Gambling Establishments
- Lodging Facilities
  - Bed and Breakfast Inns
  - Hotels and Motels
  - Other Lodging Facilities
- Outdoor Events Facilities
  - Amusement, Theme, and Water Parks
  - Community Parks, Fairgrounds, Pavilions
  - Community Water Facilities
  - Community Special Gatherings
    - Parades
    - Special Events
- Public Assembly/Sports Leagues Facilities
  - Amphitheaters
  - Arenas
  - Convention Centers
  - Golf Courses and Country Clubs
  - Motor Racetracks
  - Movie Theaters
  - Museums, Planetariums
  - Performing Arts Centers and Auditoriums
  - Stadiums
  - Zoos, Aquariums, Botanical Gardens



- Public Assembly/Other Facilities
  - Entertainment Districts
  - Fitness and Recreational Facilities
  - Marinas
  - Skiing Facilities
  - Other Amusement and Recreational Facilities
- Real Estate Facilities
  - Office Buildings
    - Office Buildings – Stand Alone
    - Office Districts
    - Office Parks
  - Residential Units
    - Multi-Family Residences
    - Single-Family Residences
- Retail Facilities
  - Store Retailers
    - Shopping Centers and Malls
    - Shopping Districts
    - Stand-Alone Stores
  - Non-Store Retailers
- Community Organization Facilities
  - Religious Organization Facilities
  - Social Advocacy Organization Facilities
  - Civic and Social Organization Facilities
  - Political Organization Facilities
- Other Commercial Facilities
  - Weather Forecasting Services



## Communications

- Wired Communications
- Wireless Communications
- Satellite Communications
- Internet
- Information Services
- Next Generation Networks
- Regulatory, Oversight, and Industry Organizations
- Other Communication Facilities

## Critical Manufacturing

- Primary Metal Manufacturing
- Machinery Manufacturing
- Electrical Equipment, Appliance, and Component Manufacturing
- Manufacturing
- Transportation Equipment Manufacturing

## Dams

- Dam Projects
- Navigation Locks
- Mine Tailings Dams
- Hurricane Barriers
- River Control Structures
- Levees
- Regulatory, Oversight, and Industry Organizations
- Other Dam Facilities

## Defense Industrial Base

- Shipbuilding Industry
- Aircraft Industry



- Missile Industry
- Space Industry
- Combat Vehicle Industry
- Ammunition Industry
- Weapons Industry
- Troop Support Industry
- Information Technology Industry
- Electronics Industry
- Electrical Industry Commodities
- Electronic Industry Commodities
- Mechanical Industry Commodities
- Structural Industry Commodities

## Emergency Services

- Law Enforcement
- Fire, Rescue, and Emergency Services
- Search and Rescue
- Emergency Medical Services
- Emergency Management

## Energy

- Electricity
- Petroleum
- Natural Gas
- Coal
- Ethanol
- Regulatory, Oversight, and Industry Organizations

## Government Facilities

- Personnel-Oriented Government Facilities
  - Personnel-Oriented Buildings and Structures



- Offices and Office Building Complexes
  - Agency Headquarters
  - Field, District and Satellite Offices
  - Legislative Chambers and Offices
  - Judicial Chambers and Offices
  - Data and Call Centers
- Housing
- Correctional Facilities
- Embassies, Consulates, and Border Facilities
- Educational Facilities
  - Pre-Kindergarten
  - Licensed Day Care Facilities
  - K-12 Schools
  - Higher Education Facilities
  - Specialized Education Facilities
- Personnel-Oriented Land
- Service-Oriented Government Facilities
  - Service-Oriented Buildings and Structures
    - Emergency Services
    - Maintenance and Repair Shops
    - Operations, Command, Dispatch, and Control Centers
    - Training Buildings
    - Libraries
  - Service-Oriented Land
- Government Research Facilities
  - Government Research and Development Buildings and Structures
    - Analysis and Assessment Research Facilities
    - Environmental Research
    - Basic Science Research





- Aerospace Research Facilities
  - Military Research
- Government Research and Development Land
- Government Storage and Preservation Facilities
  - Storage and Preservation Buildings and Structures
    - Archive and Record Centers
    - Warehouses
    - Weapons and Ammunition Storage
    - Precious Metal Storage
    - Currency Storage
    - Special Nuclear Materials and Waste Storage
  - Storage and Preservation Land
- Government Sensor and Monitoring Systems
  - Global Positioning System
    - Global Positioning System (GPS) Space Segment
    - GPS Control Segment
  - Government Observation Systems
- Government Space Systems
  - Military Facilities
    - Launch Vehicles
    - Launch Facilities
    - Mission Control Facilities
    - Satellites
  - National Aeronautics and Space Administration (NASA) Facilities
    - Launch Vehicles
    - Launch Facilities
    - Mission Control Facilities
    - Satellites
  - Military Facilities



- Army Bases
- Navy Bases
- Marine Corps Bases
- Air Force Bases
- Coast Guard Bases
- National Guard Facilities
- Joint and Combined Military Installations
- Reservations
- Other Government Facilities
- Other Government Buildings and Structures
- Other Government Land

## Healthcare and Public Health

- Direct Patient Healthcare
- Public Health Agencies
- Healthcare Educational Facilities
- Health Supporting Facilities
- End-of-Life Facilities
- Regulatory, Oversight, and Industry Organizations

## Information Technology

- Hardware Production
- Software Production
- Information Technology Services
- Internet
- Next Generation Networks
- Regulator, Oversight, and Industry Organizations

## National Monuments and Icons

- National Monument/Icon Structures
- National Monument/Icon Geographic Areas



- National Monument/Icon Documents and Objects
- Other National Monuments and Icons

## Nuclear Reactors, Materials and Waste

- Nuclear Power Plants
- Research, Training, and Test Reactors
- Nuclear Fuel Cycle Facilities
- Radioactive Waste Management
- Nuclear Materials Transport
- Deactivated Nuclear Facilities
- Radioactive Source Production and Distribution Facilities
- Regulatory, Oversight, and Industry Organizations
- Other Nuclear Facilities

## Postal and Shipping

- U.S. Postal Service
- Couriers
- Other Postal and Shipping Facilities

## Transportation Systems

- Aviation
- Railroad
- Road
- Maritime
- Mass Transit
- Pipelines
- Regulatory, Oversight and Industry Organizations

## Water

- Raw Water Supply
- Raw Water Transmission



- Raw Water Storage
- Water Treatment Facilities
- Treated (Finished) Water Storage
- Treated Water Distribution Systems
- Treated Water Monitoring Systems
- Treated Water Distribution Control Centers
- Wastewater Facilities
- Regulatory, Oversight, and Industry Organizations



